

1, 1948

TRACTORS • TRAILERS • BODIES • ENGINES • AIRCRAFT



FARM & ROAD MACHINERY • PARTS • ACCESSORIES

EQUIPMENT • FORM PRODUCTION • SERVICE • MAINTENANCE

AUTOMOTIVE INDUSTRIES

PINGER CARS • MOTOR TRUCKS • BUSES

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Entirely New 1949 Mercury

Boosting Engine Output with Alcohol-Water Injection

The 155 MPH Maserati Racer

Futuramic Bodies Require Major Change-Over

Inflation and Depreciation

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Plant benefits 4 ways with...

STANICUT 62FC Cutting Oil



A switch from a soluble oil to Stanicut 62 FC cutting oil paid off these four ways on a piston-pin lapping operation at the Elgin Machine Works, Inc., Elgin, Illinois.

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Fewer Operations. A dipping operation for rust prevention—formerly required when using a water emulsion—was eliminated.

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 1, 1948

Vol. 98, No. 8

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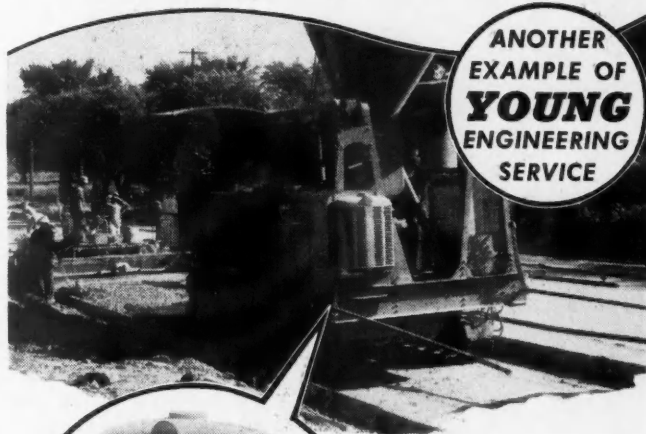
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RUGGED ROAD-BUILDERS USE YOUNG RADIATORS



ANOTHER
EXAMPLE OF
YOUNG
ENGINEERING
SERVICE

● Left: A Young Radiator, with cast iron tank and side member construction and heavy, stamped sheet steel grille, is used on huge portable cement mixers made by Koehring Company, Milwaukee, Wis.

● Picture an endless ribbon of roadway, a blistering hot sun, and tons of sand and cement. It takes a "tireless" piece of machinery to stand such punishment. A paver, like the Koehring pictured above, can do it. Cooling the engine of a unit like this is a tough assignment for any radiator. Conditions surrounding the use of such road-building and earth-moving equipment (as well as literally hundreds of other automotive applications) are an old story to Young Engineers. They have specialized in the design and manufacture of heat transfer equipment since the internal combustion engine came into prominent use on industrial machinery.

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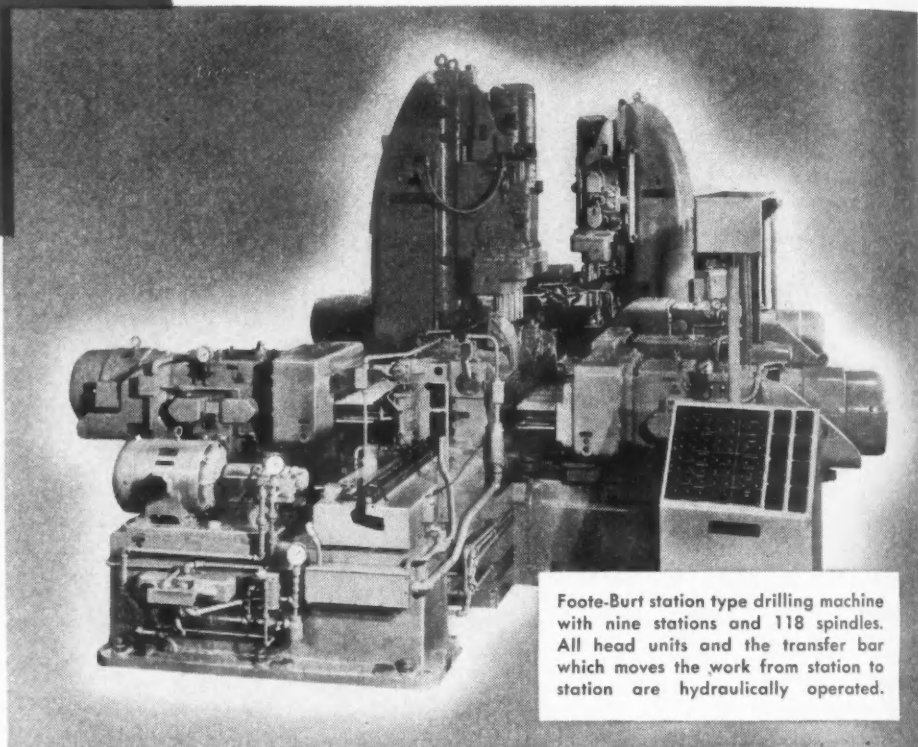
HEATING, COOLING AND AIR CONDITIONING PRODUCTS

Convectors • Unit Heaters • Heating coils • Cooling coils • Evaporators • Air conditioning units •

RUST SLUDGE

KEEP 'EM OUT!

Keep hydraulic
systems clean ...
use **Texaco Regal
Oils (R&O)**.



Foote-Burt station type drilling machine with nine stations and 118 spindles. All head units and the transfer bar which moves the work from station to station are hydraulically operated.

Photo courtesy The Foote-Burt Company

TEXACO REGAL OILS (R & O) keep rust and sludge out of hydraulic systems. One user says: "Since using *Texaco Regal Oil (R & O)* we have greatly reduced machine down-time." Another says: "Since using *Texaco Regal Oil (R & O)* we have experienced smoother operation with no shut-downs or part replacements."

Texaco Regal Oils (R & O) are turbine-grade oils containing special inhibitors to prevent the rust and sludge formations that cause costly stoppages. They are also processed to prevent foaming. Their use assures more dependable operation ... fewer pro-

duction interruptions ... lower maintenance costs.

Makers of hydraulic equipment are enthusiastic, too. Leading manufacturers recommend *Texaco Regal Oils (R & O)* ... and many ship their units charged with them. There is a complete viscosity range of *Texaco Regal Oils (R & O)* ... for every type and size of hydraulic unit.

Let a Texaco Lubrication Engineer give you full details. Just call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



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**AUTOMOTIVE
INDUSTRIES**

Reg. U. S. Pat. Off.

High Spots of This Issue

Tractor Production at Massey-Harris

Massey-Harris has completed its housing program by moving into a newly-equipped and better arranged plant. This new tractor production layout is described on pages 24-26.

Entirely New Mercury

The 1949 Mercury, completely new from bumper to bumper, features a more powerful 110-hp engine, new body and sheet metal and independent front suspension with coil springs. Complete description and photos of this new car are presented on pages 28-30.

Oldsmobile Golden Anniversary

Highlights of Oldsmobile's 50 years of progress in manufacturing passenger cars are covered by Leonard Westrate, AI News Editor in Detroit, on pages 32 and 33. The article includes a yearly chronology of important Oldsmobile events, and thumb nail pictures of early and current Oldsmobile cars.

Alcohol-Water Injection in Passenger Car Engines

Tests carried out by the Department of Agricultural show that alcohol-water injection can raise the effective octane number of standard-grade gasoline from 73 to 90. These tests are part of a comprehensive program for investigating the practicability of alcohol-water injection in higher compression-ratio automobile engines. They are described in the article on pages 34-37.

Building Futuramic Bodies

Adoption of the Futuramic body on the 1948 Series 98 Oldsmobile brought with it the Lansing Fisher Body plant's first major change-over in body building practice since before the war. What these changes are, and how the Futuramic bodies are built, is told on pages 42-44.

28 New Product Items And Other High Spots Such As:

A study of depreciation of manufacturing industries' plant; details of the new Maserati racing car; abstracts of papers presented at the SAE Passenger Car and Production Meeting; two new European transmissions; a small simple machine for testing gears and lubricants; and special equipment displayed at the ASTE Exposition.

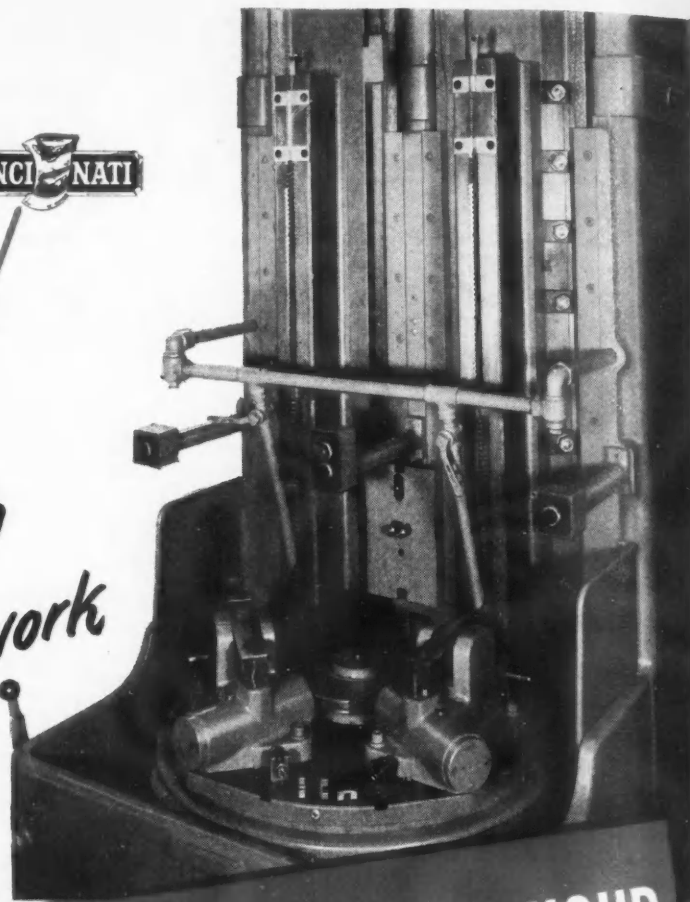
*News of the Automotive Industries, Page 17
For Complete Table of Contents, See page 3*



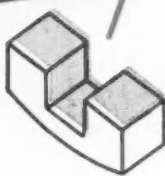
CINCINNATI No. 5-54 Vertical Duplex Hydro-Broach. Catalog No. M-1387-1. And a new publication is available, "How to Step Up Production with CINCINNATI Hydro-Broach Machines." Write for a copy of publication, M-1599.



This Hydro-Broach eliminates tiresome work



and BROACHES UP TO 800 PARTS PER HOUR



View of part, showing broached surfaces in color. The fixtures shown in the large illustration handle four sizes of these parts.

Part name.....Bridge block

Material.....Extruded steel

Operation.....Broach Face, Slot and Chamfer

Production.....200 to 800 per hour, depending upon length

Equipment...CINCINNATI No. 554 Vertical Duplex Hydro-Broach completely tooled up for production.

● Give a man a machine he can run without becoming dog tired and he'll show you some real production at lower costs. That's what Cincinnati Application Engineers had in mind when they devised the method and equipment shown here for broaching small steel blocks. ¶The machine is a CINCINNATI No. 5-54 Vertical Duplex Hydro-Broach, tooled up with fixtures having interchangeable clamping details which accommodate *four sizes of parts*. As the table swivels from one cutting position to the other, the work is automatically clamped and released. This arrangement eliminates most of the tiring work incident to operating the machine, and it gives the operator a fair chance to maintain production throughout the day. ¶CINCINNATI Hydro-Broach Machines and application engineering form a combination which you can't afford to overlook in devising new and lower cost methods. Why not give these men a chance to show you what can be done in your shop? Send blueprints of parts with complete details, including sequence of operations.

THE CINCINNATI MILLING MACHINE CO.

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MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 98. No. 8

May 1, 1948

Car & Truck Output Hit by Coal Strike

Optimistic forecasts of an increase in automobile and truck production of from 10 to 15 per cent this year have already started to tarnish with the year only one-third gone. Latest blow was the protracted coal strike which is estimated to have lost one-half million tons of steel production. Automobile manufacturers estimate that the strike will ultimately cost about 215,000 automobiles and trucks. Other complicating factors are the uncertain requirements of the Marshall Plan and the rearmament program. Ford recently reported that it has revised downward slightly its projected schedules for the year. Some of the more gloomy prophets predict that there is no possible chance to reach the 5.5 million goal originally set for 1948 and that the industry will do well to produce as many cars and trucks as it did last year.

For the short range picture, the result of the coal strike has been to curtail production sharply in some cases, and to suspend it in others. GM ran short of pig iron and steel and was forced to suspend foundry, machine shop, and press room operations in all automotive divisions by April 23. Assembly plants were to continue operations as long as banks of materials held out. However, the company expected to be able to resume operations in its manufacturing operations by May 3. Chrysler was also reported on the verge of a shutdown because of critical shortages of materials, principally steel. In fact, reduction in output is expected in the next 60 to 90 days.



PAUL G. HOFFMAN

Becoming Economic Cooperation Administrator, Paul G. Hoffman has resigned as president and a director of the Studebaker Corp. H. S. Vance, chairman of the board, has been elected to serve also as president. Recently interviewed, Mr. Hoffman stated that purchases of durable goods for rehabilitation will be handled by the foreign nations themselves, or their agencies, while food and relief purchases will be made by our own government.

GM Production in March Sets Postwar Record

General Motors hit a postwar production high during March with a total of 209,597 cars and trucks. Highest previous monthly output was

last December with nearly 195,000 units. Through March, total GM output was 547,017.

Tucker Gets Turbo-Jet Engine Patents

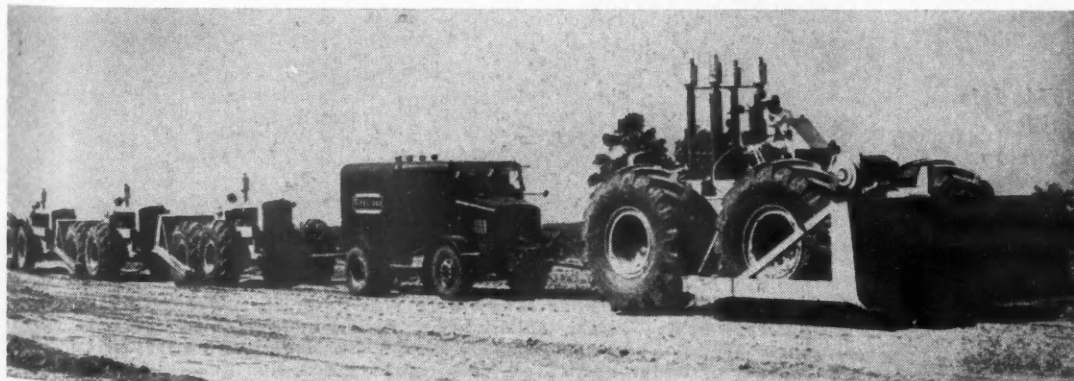
The Tucker Corp. has announced appointment of Secundo Campini of Milan, Italy as vice president in charge of turbo-jet engine development and research. Tucker has also acquired all patents held by the Italian scientist and inventor for the turbo-jet.

Ford Starts Constructing Research Center

Construction has started on the first unit of the multimillion dollar Ford Research Engineering Laboratory announced by the company, shortly after the end of the war. Start of the project had been delayed because of excessive costs. The only part under construction at present is one wing of the Dynamometer Building.

Continental Ready to Fill Armament Needs

C. J. Reese, president, Continental Motors Corp., reported to stockholders recently that both Continental Motors and Continental Aviation and Engineering Corp. had been working actively on important research and development projects for the military services since V-J Day, and that plans have been carefully worked out for any important production assignments which Continental might receive under an armament program.



MEASURING THE MASSIVE

Said to be more than twice the size of previous testing equipment, this new dynamometer, built and designed by the Firestone Tire and Rubber Co., has a draw-bar measurement capacity of 100,000 lb. It is shown measuring the draw-bar pull of an A Tournadozer.

NEWS of the AUTOMOTIVE INDUSTRIES

NEW CAR REGISTRATIONS*

ARRANGED BY MAKES IN DESCENDING ORDER ACCORDING TO THE 1948 TOTALS

	January 1948	January 1947	Per Cent of Total 1948	Per Cent of Total 1947
Chevrolet . . .	51,960	40,384	20.06	20.79
Ford . . .	42,499	33,378	16.41	17.19
Plymouth . . .	28,616	17,645	11.05	9.08
Dodge . . .	19,075	12,509	7.37	6.44
Buick . . .	17,042	14,778	6.58	7.61
Pontiac . . .	15,346	11,760	5.93	6.05
Oldsmobile . . .	11,383	12,883	4.40	6.63
Mercury . . .	9,633	6,918	3.72	3.56
Studebaker . . .	9,373	6,730	3.62	3.46
Nash . . .	8,114	7,901	3.13	4.07
Chrysler . . .	8,036	5,953	3.10	3.06
Kaiser . . .	7,063	2,267	2.73	1.17
Desoto . . .	6,367	4,379	2.46	2.25
Hudson . . .	6,271	6,149	2.42	3.17
Frazer . . .	5,178	1,126	2.00	.58
Cadillac . . .	4,047	3,284	1.56	1.69
Packard . . .	3,892	2,683	1.50	1.38
Willlys . . .	1,792	1,246	.69	.64
Lincoln . . .	1,607	1,439	.62	.74
Crosley . . .	1,375	779	.53	.40
Austin . . .	234	....	.09	...
All Others	69	71	.03	.04

Total . . . 258,972 194,262 100.00 100.00

* Data from R. L. Polk & Co. and includes all states with the exception of California.

Oldsmobile to Build Plant For H. C. Engine

GM's Oldsmobile Div. has given substance to reports that it will have a completely new engine in its 1949 model. The company confirmed that it is building a new engine facility at Lansing which will be under the direction of Marvin L. Katke. Although the division declined further comment, it is known that the engine will be a V-8, valve-in-head type and will probably be in production sometime this fall. It is believed that the engine will have a compression ratio of not more than 8 to 1 at the outset, but will be designed basically with the necessary rigidity and strength for ultimate compression ratios of possibly 12 to 1. General information from the oil industry is that high octane gasolines in the required volume for common use in high compression engines is still a long time away. As a result, compression ratios will increase over the next few years very gradually.

1949 Ford Pilot Models Being Assembled

Production of 1949 Mercurys at the Rouge plant is strictly on schedule and is increasing daily, but output at three new Lincoln-Mercury branch assembly plants is slightly behind schedule, the company reports. Alterations to physical facilities at the Rouge plant are virtually completed and the pilot models of the new Ford are just starting to roll down the as-

sembly line. With removal of bus and truck production from the Rouge plant to Highland Park, and with modernization and expansion of existing facilities, production capacity for passenger cars there has been increased to 750 daily. The new 1100 ft Ford assembly line is scheduled to turn out 500 cars each eight-hour shift, 150 more than could be built on the old 860 ft line. In addition, the Mercury production line has a schedule of 250 units daily.

Select Chevrolet to Pace Indianapolis Race

Officials of the Indianapolis Motor Speedway have selected Chevrolet as the pace car at the Indianapolis 500 mile race this year. The car will be driven by Wilbur Shaw, president of the Speedway Corp., and a three-time winner of the race. He has not appeared on the track since the 1941 race when a broken wheel put him out of the running. The final list contains 67 official entries.

Car Output Not Yet Affected by Armament Program

Although an occasional rumor of automobile plants converting to war production crops out occasionally, such reports are not nearly so prevalent as a few weeks ago. It is now apparent that automobile companies are not going to halt automobile production to start making armament unless the situation suddenly becomes much more serious than it has up to this time. While Army officials have been in Detroit visiting various companies in a survey of facilities that could be used in case of an emergency, so far as can be determined that is as far as they have

gone. Meanwhile the WAA has been ordered to withhold disposal action on all unsold industrial plants including machinery, tools and other production equipment until the situation is clarified. Plants covered by a national security clause which requires the plant be maintained in such a condition that it could be reconverted to war production in 120 days are exempted from the order. It is estimated that more than 150 former war plants are covered by such a clause. The Kaiser-Frazer plant does not carry a stipulation that it be reconverted to wartime use in case of an emergency, as had been previously reported.

Eaton Develops Automatic Truck Axle Shift

Eaton Mfg. Co. has developed an automatic electrical shift mechanism for two-speed truck axles after several years of experimental and road testing work. Details of the device, which will be introduced this fall, have not yet been announced. No declutching or accelerator manipulation is required during the shifting operation. The company has also developed for introduction later this year a semi-automatic electrically actuated shift control for two-speed axles, but this type requires clutch and accelerator action on the part of the driver. Both types will be available at the outset only for the company's heavy duty axles built for trucks with capacity of three tons or more. It is expected that the semi-automatic type will be standard equipment on Eaton two-speed axles, with the automatic unit an extra feature. Either type can be installed as a replacement unit for present types of control.



FOAM FIRE FIGHTER

For use in industrial plants, the petroleum industry, and on airports, the new fire fighting trailer shown here was designed and equipped by the National Foam System, Philadelphia. Pulled by a pick-up truck, it produces 2500 gal of fire smothering foam in less than two minutes. It carries 250 gal of water and 25 gal of special foam-making liquid (Aer-o-foam).

NEWS *of the* AUTOMOTIVE INDUSTRIES



ROAD REPAIRER

Embodying all of the basic principles of FWD design, the new 1948 FWD Maintainer, was recently announced by the Four Wheel Drive Auto Co., Clintonville, Wis. A standard model in the company's "H" series, the Maintainer, designated as the HG, was developed especially for the maintenance of dirt and gravel roads.

Briggs 1947 Net Profit \$7.5 Million

Although net sales last year were nearly twice as high as in 1940, Briggs Mfg. Co. earnings in 1947 were at the rate of 3.6 per cent, compared with 5.9 per cent in the prewar year. Net profit last year after taxes was \$7,512,000. The report shows that in the last two years before the war and the three years following it, the company spent more than \$30 million to expand facilities, modernize factory layouts and to acquire new machinery and production equipment. Total floor area has been increased from 4.5 million sq ft to 6.9 million sq ft.

Packard of Canada Names Williams to Board

Fred C. Williams, general manager of Packard Motor Car Co. Ltd. of Canada, has been made director of the Canadian company to succeed the late Col. E. S. Wigle.

Ford to Make Light Car in France

The small, lightweight automobile under development at Ford and then shelved last year has bobbed up in the news again. Henry Ford II, upon his return from Europe, revealed that the car with some modifications will be built in France by the Ford S.A.F. and will be introduced in October. The car will use the old Ford V-8 60-hp engine, currently being pro-

duced in France, rather than the power plant originally developed for the light car. The engine has been stepped up from 60 hp to 66 hp. He said that tooling costs would prohibit using the originally designed engine. He added, however, that the car would fundamentally be the same as the one developed here and would be in the medium price class. He said also that Ford Motor Co. Ltd. at Dagenham, England, is developing a new model which will be introduced to the public at the Auto Show there this fall. He said that the current model was designed in 1936 and is obsolete even by English standards. He reported that Ford management is resuming full control of operation of the Cologne plant which was damaged slightly during bombing raids during the war. It has been operated by the British military government producing almost all of the trucks made in Germany.

Labor

GM and Chrysler Resist Union Demands

Labor relations in the automobile industry took on a slightly grimmer aspect during April as negotiations between the union and Chrysler Corp. and GM got down to business. Chrysler negotiators called in local representatives to determine what action should be taken in view of the com-

pany's stiff opposition to union demands. While a strike at Chrysler is still not considered a serious probability, the outlook is not as favorable as it was a few weeks ago. It is reported that Chrysler has made no counter offers to the union's initial demands. At last reports, GM was standing firm against inclusion of a union shop agreement in the new contract now under consideration. Union officials accuse GM of throwing every possible obstacle in the way of an election on the issue by its employees. GM negotiations have not yet reached the point of dollars and cents bargaining on hourly increases.

NLRB Says Employers Must Bargain on Pensions

In a decision important to the automotive industries, NLRB has ruled that employers must bargain on pension plans if employees request it. The decision is expected to have an important bearing on negotiations between the UAW-CIO and GM. In effect the board said that pension plans fall within the scope of the Taft-Hartley Act in the category of wages. J. Copeland Gray, only dissenting member of NLRB in a minority opinion stated that it is impractical and infeasible to require collective bargaining concerning retirement programs as a matter of law. Complexities and confusion would inevitably result, he said.

NEW TRUCK REGISTRATIONS*

ARRANGED BY MAKES IN DESCENDING ORDER ACCORDING TO THE JANUARY 1948 TOTALS

	Jan-uary 1948	Jan-uary 1947	Per Cent 1948	Per Cent of Total 1947
Chevrolet	21,876	16,976	33.38	28.56
International ..	9,875	6,982	15.07	11.75
Ford	7,124	13,444	10.87	22.62
Dodge	6,784	8,813	10.35	14.83
G.M.C.	5,136	3,380	7.84	5.69
Willys Jeep....	3,762	2,371	5.74	3.99
Studebaker ...	3,703	2,116	5.65	3.56
Willys Truck..	1,133	.....	1.73	.....
Reo	1,112	1,049	1.70	1.76
Mack	1,044	517	1.59	.87
White	987	943	1.50	1.59
Diamond T ...	780	716	1.19	1.20
Diveco	516	322	.79	.54
Federal	399	361	.61	.61
Brookway	360	465	.55	.78
Autocar	284	416	.43	.70
Crosley	151	.....	.23	.....
F.W.D.	106	95	.16	.16
Ward .....	.....	.....	.....	.....
La France..	45	63	.07	.11
Oshkosh	36	25	.05	.04
Hudson	32	161	.05	.27
Sterling	24	36	.04	.06
Kenworth	17	.....	.03	.....
Nash	2	.....	.....	.....
All Others ...	247	190	.38	.31
Total	65,535	59,441	100.00	100.00

* Data from R. L. Polk & Co. and includes all states with the exception of California.

NEWS of the AUTOMOTIVE INDUSTRIES

White Nets \$5.5 Million in 1947

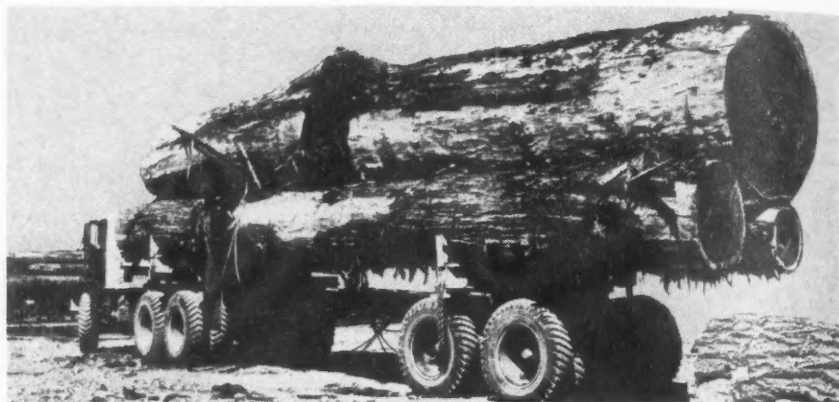
Despite an increase in net profit in 1947, the percentage of profit to net sales was down to 4.6 per cent from 5.1 per cent in the last prewar year of 1940, due to increased costs and decreased margins, the White Motor Co. announced recently in reporting 1947 operations. Net sales in 1947 of \$117,902,146, compares with \$73,857,526 in 1946. During 1947, a total of 19,669 commercial trucks and busses were sold as compared with 12,916 in 1946. Net profit for 1947, after all charges including depreciation and provision for Federal and Canadian taxes on income, amounted to \$5,469,048, which compares with a net profit of \$1,971,694 in 1946.

Open New Diesel Laboratory In Oklahoma

Allocated by the Office of Technical Services of the Dept. of Commerce and the U. S. Office of Education, a fully-equipped Diesel research laboratory has been opened at the Oklahoma Agricultural and Mechanical College, Stillwater, Okla. Said to be one of the world's best equipped, the laboratory, found at the Klockner - Humboldt - Deutz Diesel engine plant at Oberursel, Germany, was engaged in the development of two-cycle Diesel engines for automobile and aircraft application involving the loop scavenging principle.

To Hold 1948 ASI Show In Chicago, Dec. 6-10

To be held in Chicago from Dec. 6 to 10, the 1948 Automotive Service Industries Show will be sponsored, as in the past, by the Motor & Equip-



HEAVY HAULING

In the fleet of the Hammond Lumber Co., California, loads up to 75 tons are hauled regularly on Fruehauf TL-1010 logging trailers pulled by Mack tractors.

ment Wholesalers Association, Motor & Equipment Manufacturers Association, and National Standard Parts Association. Exclusively a wholesaler's affair, the show will be only open to members of the sponsoring associations on the first three days, Dec. 6-8. Invited guests may only attend Dec. 9-10.

GM to Show Three Heavies At Oil Exposition

Three heavy duty truck models, engineered for oil field work, will comprise the exhibit prepared by GMC Truck & Coach Div. to be displayed in the GM building at the International Petroleum Exposition to be held in Tulsa, Okla. in May. All three trucks are suitable for various phases of oil field operation, and the models comprising the GMC Truck exhibit are all chassis and cab units in order that their mechanical construction may be readily visible. Outstanding in the exhibit will be a giant

six wheeler with both rear axles driving. This GMC Model ADCW-979 is powered by a GM 6-71, six-cyl, two-cycle Diesel engine, and it has a GVW of 55,000 lb. The wheelbase of the truck is 286 in. to accommodate the standard body length used in oil field work. Another truck in the exhibit will be a GMC Model AC-805 with a wheelbase of 196 in. This unit is powered by a GMC-built, valve-in-head engine of 426 cu in. displacement.

Gibbons Gets '47 SAE Wright Award

Henry Bendel Gibbons, chief of structures for the Chance Vought Aircraft Div., United Aircraft Corp., received the 1947 SAE Wright Brothers Award on April 15. His technical paper, "Experiences of an Aircraft Manufacturer with Sandwich Material," which won for him the high honor, was based upon his development of this novel type of wing construction.

Graham-Paige '47 Profit \$123,766

Graham-Paige Motors Corp. reported a net profit of \$123,766 for the year ended Dec. 31, 1947, as against a net loss of \$4,357,542 for 1946. Net sales for 1947 totaled \$13,389,620, against 1946 sales of \$11,513,576. Joseph W. Frazer, president and chairman, said that following the sale of its automotive assets to Kaiser-Frazer Corp. in Feb. 1947, Graham-Paige Motors Corp. had become the largest stockholder in K-F, owning a total of 18.52 per cent of the outstanding stock of that company which reported net earnings of \$19,015,677 last year.

NEW PANEL

GM's Oldsmobile Div. has introduced in its 1948 Futuramic Series '98' cars this new instrument panel in which the controls are grouped together directly ahead of the wheel, and the clock has been moved from the glove box door to the "V" area at the center of the windshield.



NEWS *of the* AUTOMOTIVE INDUSTRIES

UK Exported 16,800 Cars In February

During February, the United Kingdom exported 1200 automobiles to the United States, which equals the total exported to that country in 1947. Total exports for the month were 16,800 automobiles, in addition to 4200 trucks. Average weekly production during February was 5800 passenger cars and 3000 trucks. During March the British Ford Co. exported 4851 passenger cars, 1354 trucks and 2227 tractors.

Name Holland President of ASTE

Irwin F. Holland, general superintendent of Pratt & Whitney's Small Tool and Gage Div., Hartford, Conn. was named president of the American Society of Tool Engineers during the sixteenth annual meeting held in Cleveland, O. Mr. Holland succeeds W. B. Peirce of Pittsburgh, who will remain as a member of the national board of directors. Other officers elected were R. B. Douglas, president, Godscroft Industries Ltd., Montreal, Canada, as first vice president; H. L. Tigges, vice president, Baker Brothers, Inc., Toledo, O. as second vice president; V. H. Ericson, vice president, Johnson de Vou, Inc., Worcester, Mass. as third vice president; George A. Goodwin, chief process engineer, Master Electric Co., Dayton, O. as treasurer; and W. B. McClellan, special engineer, Gairing Tool Co., Detroit, as secretary.

Dodge Launches National Scrap Drive

Another scrap drive has been launched. This time, the Dodge Div. of the Chrysler Corp. has appealed to approximately 4000 Dodge dealers to expedite the flow of scrap iron, steel, lead, copper and brass to mills and foundries.

Two New Cierva Helicopters Near Completion

Two interesting English helicopter projects are approaching completion. One, previously announced, is the 24-place W.11 Air Horse, said to be the world's largest helicopter; the other, a light, two-place helicopter, both products of the Cierva Co. The two-seater is the W.14 Skeeter, weighing 1200 lb. The original purpose behind the Skeeter project was its use as a trainer, a stepping stone to bigger helicopters. But Cierva officials believe that the simplicity of

its design and the ease with which it can be flown will appeal strongly to the private flyer. The helicopter is largely independent of airfields, and the question of transport between home and airfield may often be solved by the helicopter. Several British town planning authorities are already considering building helicopter parks in anticipation of the helicopter age.

Studebaker to Up Jobs 40% In West Coast Plant

Studebaker Pacific Corp. anticipates a 40 per cent increase in employment at its Vernon (Los Angeles) factory immediately. With employment at this plant now 550, production is scheduled to be increased from 68 to 96 cars a day. The entire Studebaker passenger car line, with the exception of the convertible, is assembled at this plant. An assembly plant for Studebaker trucks, in addition to the present passenger car assembly plant, is planned for the near future, according to C. K. Whitaker, president, Studebaker Pacific Corp.

GM Australian Car to Roll In July

Part of a total investment of over \$25 million, about \$3.5 million of ma-

chinery has been installed already in the General Motors Holden's new factory in Melbourne, Australia. Trial production of an all-Australian passenger car is expected to start in July at the new factory.

GM's Coyle Gets '48 Parlin Award

M. E. Coyle, GM executive vice president, will receive the 1948 Parlin Memorial Award, the American Marketing Association disclosed recently. The award, conferred on Mr. Coyle for his contribution to the science of marketing, will be presented formally in Philadelphia on May 18, at which time Mr. Coyle will deliver the 1948 Parlin Memorial lecture on the subject, "The Manufacturer's Responsibility in Distribution."

More West Coast Parts for West Coast Assembly

West Coast automobile assembly plants are tending to depend more on West Coast parts manufacturers. Ford and GM, each with a projected \$60 million California parts purchasing program, have given impetus to this trend. Other automobile manufacturers are watching the development of these projects with considerable interest.



FOR JET TRAINING

Identical with the standard P-80 Shooting Star, except that its fuselage is 38 in. longer and the longer canopy encloses both cockpits, this new USAF two-place jet trainer, the TF-80C, can be used for gunnery training, flight and high speed navigation instruction. The seven ft canopy is hydraulically operated.

NEWS of the AUTOMOTIVE INDUSTRIES



TESTING UNDER CONTRACT

The USAF will conduct a 100 hr accelerated service test of the Doman Helicopter Rotor, under a contract recently awarded to Doman-Frasier Helicopters, Inc., Danbury, Conn. The rotor to be tested has been adapted to an Army R6 helicopter; it is said to be the only single-rotor helicopter in the U. S. utilizing four rotor blades.

Brazil to Set Up New Wind Tunnels

The Brazilian Aeronautical Commission has announced the purchase of \$300,000 worth of electrical equipment for two wind tunnels to be built at a new research center in Sao Dos Campos. The equipment was ordered through the Westinghouse Electric International Co. Heart of the man-made gales will be two 1600 hp elec-

tric motors, one for each of the tunnels. They will drive fans capable of generating miniature hurricanes of up to 300 mph.

Ford of Canada '47 Sales Hit \$149 Million

The highest sales of any peacetime year in the company's history were recorded by the Ford Motor Co. of Canada Ltd. with total sales in 1947

of \$149,304,072. A net profit of \$5,996,003 was realized in 1947 as against a net loss of \$239,448 in 1946. A total of 101,918 cars and trucks and 7800 tractors were sold in 1947, as compared with 79,314 and 6393 respectively in 1946. Of the 1947 total, 59.6 per cent were sold in Canada and 40.4 per cent were exported.

\$300,000 USAF Contract to United Services For Air

The U. S. Air Force has granted a \$300,000 contract to United Services For Air Inc., for combat aircraft accessories, Roger D. Edwards, president of the company disclosed recently. This is the second USAF contract the company has received. The company was organized in 1946 to perform modification of USAF C-46 cargo and personnel carriers. United Services occupies one of the WAA hangars at the Niagara Falls Airport, and all fabrication work is done at Buffalo Airport.

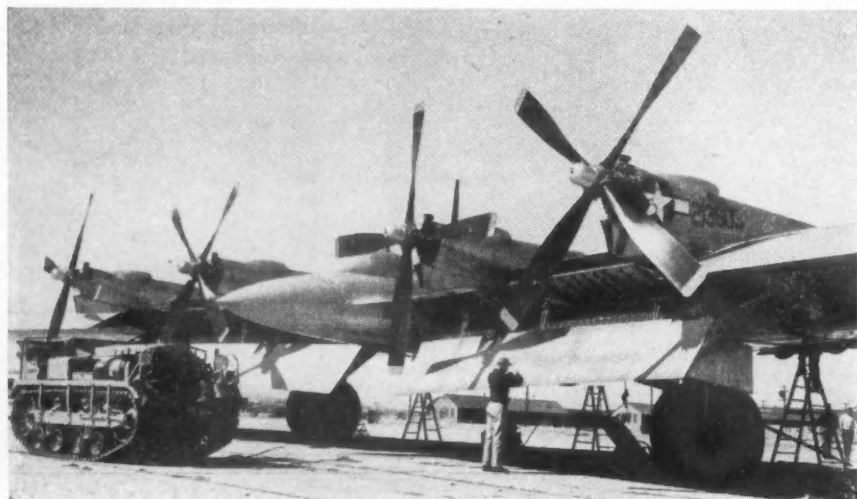
Nuffield Group to Make First Diesel Truck

First diesel-engined truck to be built by the Nuffield Organization, England, is a five-tonner with an engine produced under license from the Swiss Saurer Co. The engine, six-cyl, 3.35 by 4.92 in. bore and stroke, has a compression ratio of 19 to 1. The combustion chamber is a toroidal-shaped cavity cast in the piston crown. Use is made of a C. A. V. pump and Saurer injectors manufactured by C.A.V., the injection being a spray in a direction tangential to the upper edge of the piston cavity.

The engine is governed at 2400 rpm and develops 75 hp at that speed. The crankshaft is carried in seven bearings, diameter 3 1/16 in., while crankpins have a diameter of 2 7/16 in. Four point flexible mounting is used for the engine. The chassis incorporates a Borg & Beck clutch, a four speed transmission, a two-stage drive shaft with Layrub flexible coupling at the front end and Hardy-Spicer universals.

Dodge Assembly to Move From L. A. to Oakland

It is understood that Chrysler intends to move its Dodge assembly operations from Los Angeles to Oakland, Calif., where a new plant is being constructed. DeSoto and Chrysler assembly is expected to be added to the Los Angeles unit.



TESTING WITH BUTTER PADDLES

These four-bladed "butter paddle" reversible Hamilton Standard propellers provide the Northrop B-35 Flying Wing with a "new look." They are being employed in the joint U. S. Air Force-Northrop testing program which is said to bear out previous findings of high performance in the all-wing design.

NEWS of the AUTOMOTIVE INDUSTRIES

B-W '47 Sales Totaled \$258 Million

With sales to the automotive industries comprising 49 per cent, 1947 Borg-Warner sales totaled \$258,388,981 as against \$138,864,344 in 1946. Consolidated net profit in 1947 was \$24,523,148 as compared with \$8,549,906 in 1946.

Fruehauf Expands All-Steel Body Distribution

Fruehauf Trailer Co. is expanding distribution of its all-steel truck body line through body builders and distributors, according to W. J. Robinson, vice president in charge of sales. In addition to the company's

USAF Air Materiel Command pilots for phase two flight tests. The XB-47, one of two experimental airplanes of its type constructed under an Air Force contract, left Seattle Dec. 17 on its maiden flight. It will be joined in about six weeks by the second XB-47, which recently was rolled from the Boeing assembly line and is now receiving final installations and stationary functional tests preparatory to first flight.

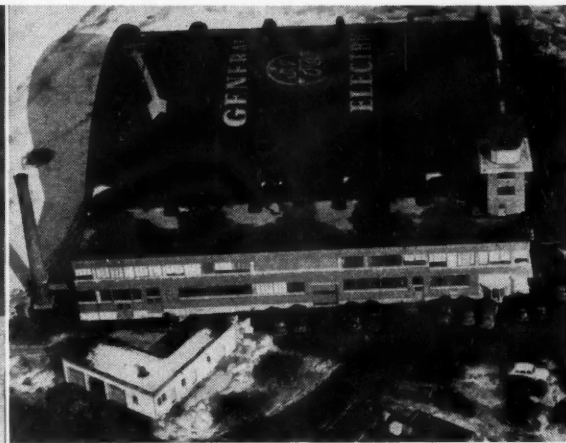
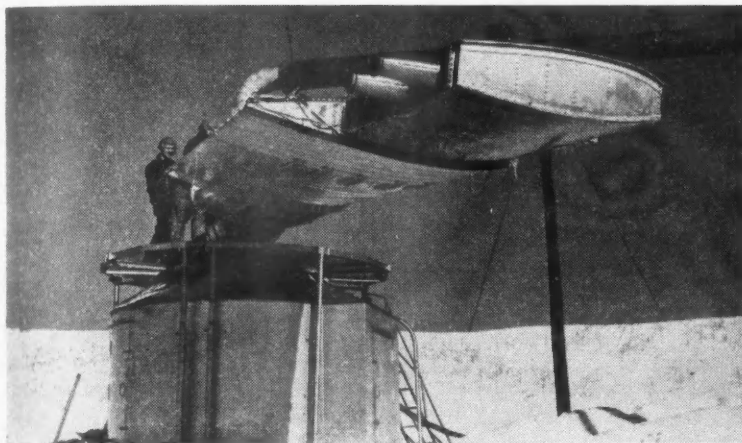
K-F Weekly Sales Hit New Peak

Weekly retail sales of Kaiser and Frazer automobiles are now at the highest rate in the history of the company, it has been revealed by Ed-

periment researchers succeeded in doubling the interval between contact with flame and destruction of coated fabric, according to a paper by Dr. Samuel G. Weissberg and Dr. Gordon M. Kline of the National Bureau of Standards, Washington, D. C., and Harvey L. Hansberry of the Civil Aeronautics Administration Experimental Station, Indianapolis. The paper was presented before the Society's Division of Paint, Varnish and Plastics Chemistry in Chicago.

Over 2000 British Austins Made Each Week

The output of British Austin automobiles has recently been stepped up from less than 1600 vehicles a week



FOR JET HELICOPTERS

Constructed at a cost of over \$100,000, these new facilities have been established at Schenectady, N. Y. by the General Electric Co. for the development and testing of component parts of proposed jet-propelled

helicopters. The close-up view at the left shows a developmental jet power plant for helicopters and the propelling mechanism. The aerial view at the right shows the overall scope of the project.

own 74 factory service branches, distributors are being appointed to further increase sales coverage, product availability and service facilities.

Boeing's Stratojet Ends First Test Phase

Boeing Airplane Co.'s 60-ton XB-47 Stratojet bomber has just completed the first phase of its flight test program "with highly satisfactory results," N. D. Showalter, chief of the company's flight test department, recently declared. All flight test work on the new U. S. Air Force airplane, the world's first swept-wing bomber, has been conducted at the Moses Lake Air Force base in central Washington.

Mr. Showalter said that the airplane would soon be turned over to

gar F. Kaiser, vice president and general manager of Kaiser-Frazer Corp. The new sales peak has made it necessary to establish a nine-hr production day to increase daily car output beyond the present schedule of 700 units, he said, and has also necessitated allocation of cars to the 4000 K-F dealers on a strict quota basis.

New Plane Coatings Retard Flames

Safer small planes are promised by recent research on flame-retardant coatings for aircraft fabrics which was reported at the American Chemical Society's 113th national meeting. Extensive fire and weather tests have been conducted on several experimental coatings, and in one ex-

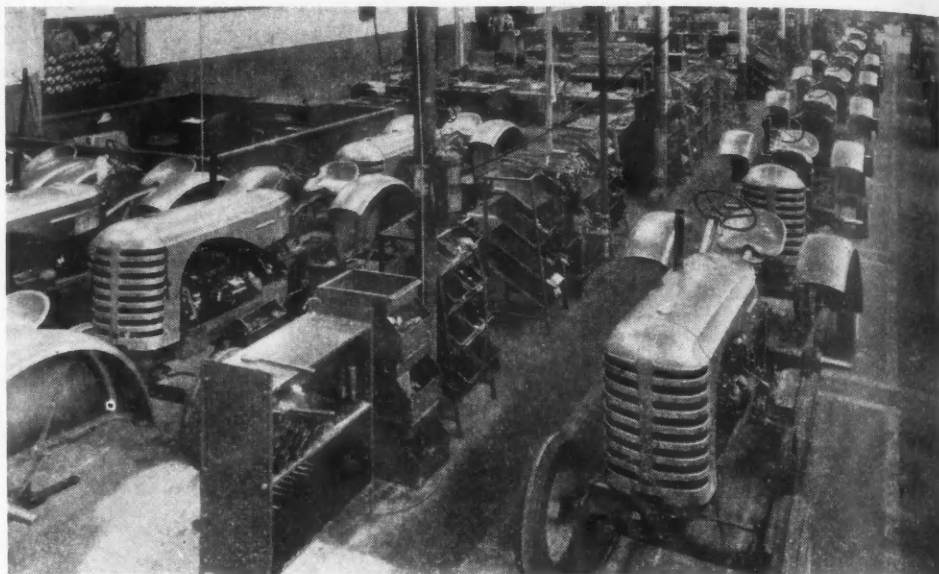
periment researchers succeeded in doubling the interval between contact with flame and destruction of coated fabric, according to a paper by Dr. Samuel G. Weissberg and Dr. Gordon M. Kline of the National Bureau of Standards, Washington, D. C., and Harvey L. Hansberry of the Civil Aeronautics Administration Experimental Station, Indianapolis. The paper was presented before the Society's Division of Paint, Varnish and Plastics Chemistry in Chicago.

Rolls Royce To Produce Truck Engines

Rolls Royce, Ltd. is reportedly planning for the first time to make three types of truck engines, four, six and eight cyl, developing from 70 to 190 hp.

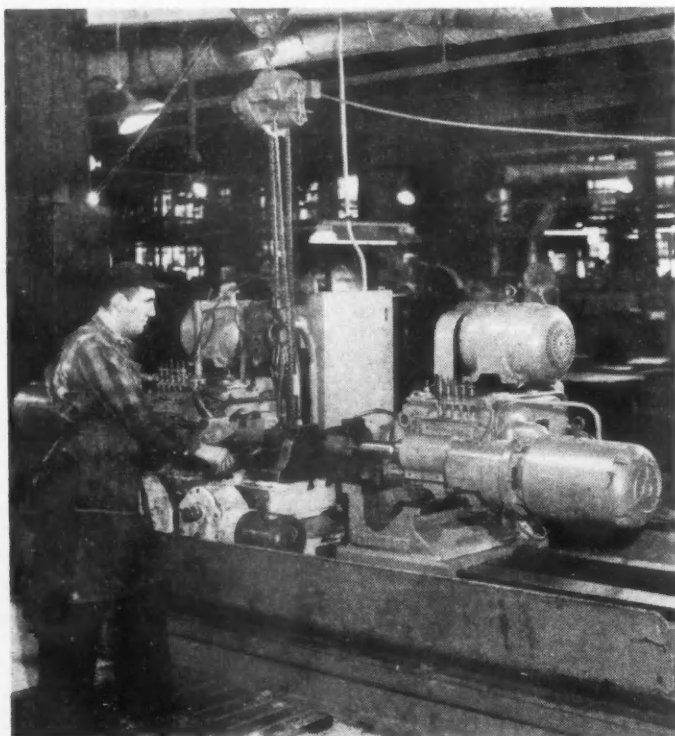
(Turn to page 84, please)

A view of several of the final tractor assembly lines at Massey-Harris showing tractors nearing the last stages of assembly. Attention is directed to the parts storage bins on each side of line for feeding parts and fastenings required at each station



Massey-Harris' New Setup for Tractor Production

By Joseph Geschelin



Among the new items of equipment is this husky machine for axle shafts. It is a two-station machine with milling to length at one station; centering at the other, in preparation for axle shaft machining

BESIDES introducing two new tractor models and restyling its entire line, the Massey-Harris Co., of Racine, Wis., in recent months completed its new housing program by moving into an extensive plant used during the war for building M-5 and M-24 tanks. This involved plant layout, departmental arrangement, the introduction of new machinery, new assembly lines and the many details associated with a major operation of this character. Massey-Harris organized its moving and rearrangement with such skill as to lose only four days of production for each of three assembly lines.

Although production has been established at a satisfactory rate, the master mechanic's department is now in the process of combing all operations to achieve further production improvement and cost reduction. Among other things they contemplate the introduction of still more new equipment, some of it of special purpose type. In view of the many ramifications of process in this plant, this study is designed to give the highlights of some of the more unusual techniques and metal cutting operations, recognizing that it represents a mere sampling of a major manufacturing establishment.

Easily the largest single element of the tractor is the frame—the backbone of the machine. The present methods of machining are being refined and additional single-purpose machines contemplated. One of the new machines on this line is a large special machine for milling cer-



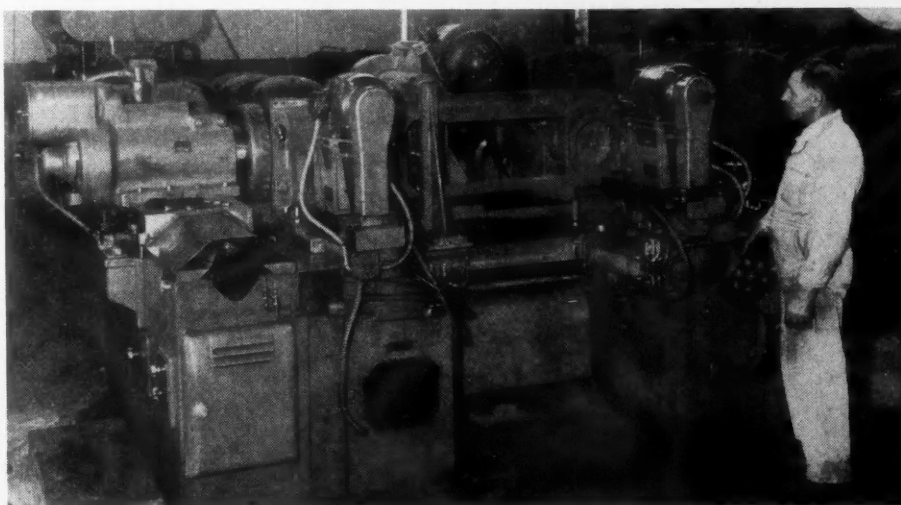
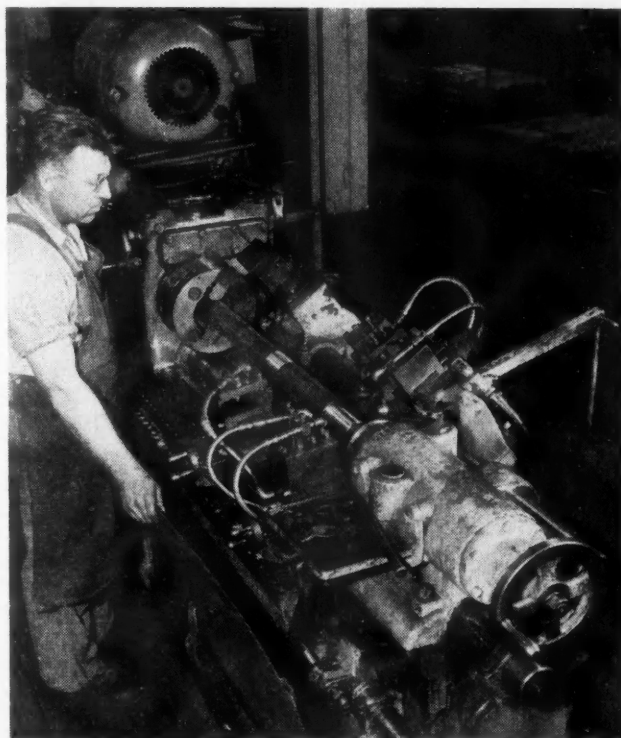
Tractor assembly starts at this end with the assembly of the final drive which is attached to the transmission further along the line

Close-up of work station of new 60-in. Fay automatic lathe for turning axle shafts

tain sections and for drilling two locator holes. As illustrated, one large milling cutter finishes the end while two cutters in the center finish pads, and a cutter at the rear finishes the motor mount pad. Two drill heads mounted on the opposite side of the frame drill the locating holes to provide for alignment in subsequent fixtures. The latest machine for this set up, in process of erection by the manufacturer, will be a three-station unit for drilling the frame at one end, a center station for thorough blow-off of chips, and the other end station for tapping. The drilling station will handle more than 100 holes in the single setting. Incidentally the movement of work from one station to another will be handled by a transfer mechanism.

Easily the most spectacular of the many unusual operations found here, is the machining of axle shafts which range in length from 39 to 60 in. What makes the job distinctive is that the bars are heat treated before machining to a hardness of 302-363 Brinell. Withan SAE 4145 steel this poses an extremely difficult metal cutting operation. Despite that they have tooled the shafts for maximum speed using special grades of solid-carbides, selected by trial and error over a long period of time.

Machining of axle end sections from the rough bar is done in three stages. First the shafts are milled to exact length in the massive duplex

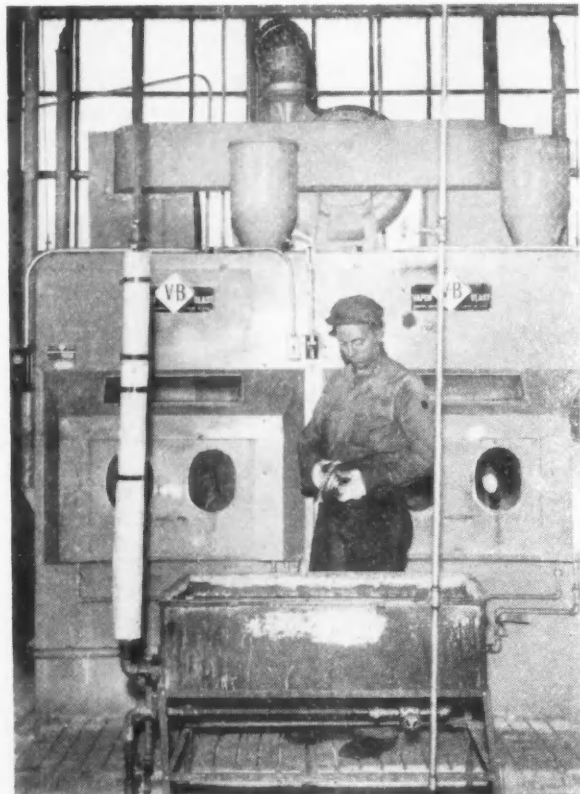


This is a view of the recently installed large special milling machine for the big tractor frames

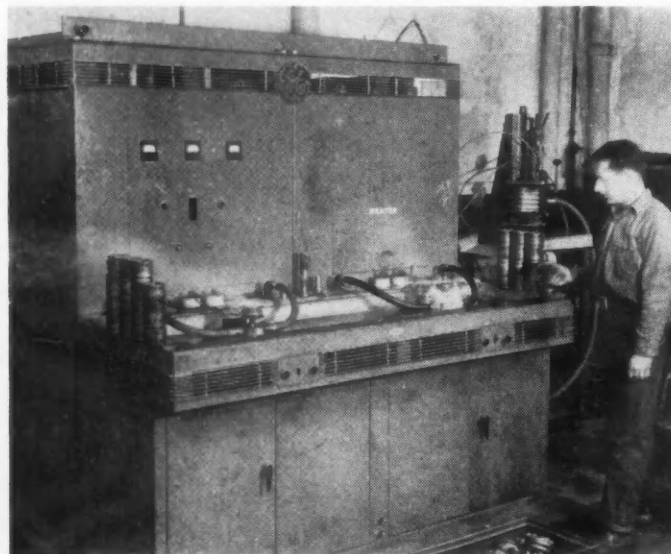
type mill shown here. At the same time the milled end are centered at another station of the same machine. Using six-blade milling cutters with special solid-carbide tips, milling is done at a surface speed of 450 fpm. The cutters are ground with a negative rake and milling is done dry.

Following milling the axle shafts go to a battery of 12 in. by 60-in. automatic lathes, provided with

Unusual application of the familiar Vapor-Blast technique is this cabinet in the heat treating department. It is used for Vapor-Blasting of all spur gear teeth for smooth finish contributing largely to increased gear life



Selective hardening of a variety of parts is done in this General Electric Electronic heater. Special coils are installed to suit the design of individual parts



special bracing to increase the rigidity of the bed. Machining of the two end sections is done in two operations, shifting from one machine to another. Here again they used a special grade of solid-carbide tools, the tools being arranged for plunge cutting. Considering that they remove about $\frac{1}{4}$ in. of metal with a feed of 0.015 in. per revolution, it is remarkable to learn that cutting is done at a surface speed of 300-325 fpm. For this operation the work and tools are flooded with a soluble oil mixture.

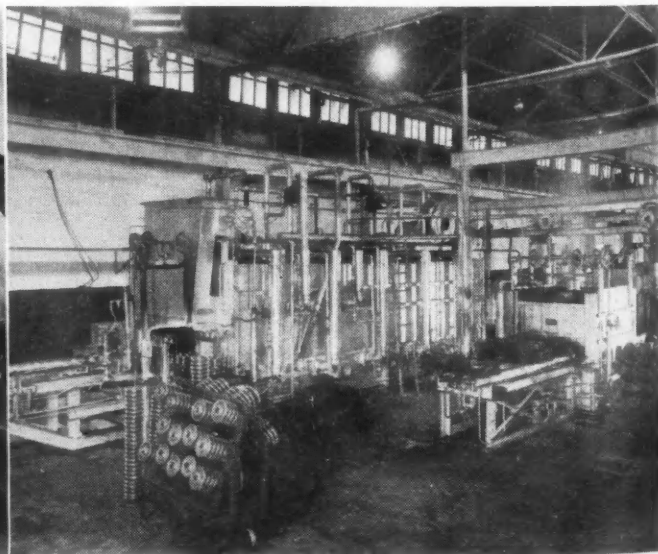
In addition to the foregoing, one machined end is splined. This is a 10 spline, 30 degree pressure angle involute tooth form cut standard hobbing machines. Selected hobs of high speed tool steel have proved to be perfectly satisfactory for the operation, cutting being done with a feed of 0.060 in. per revolution.

Great strides have been made by the company in the utilization of the most advanced gear-cutting and heat-treating techniques. Most of the gearing is of spur type, some of the parts being of cluster type. Cluster gears are cut in Fellows gear shapers, while the majority of the other gears are cut in Barber-Colman hobbors. Latest practice is to semi-finish by shaping or hobbing, then to shave in National Broach Red Ring gear shavers, using circular shaving cutters.

It is appropriate to mention at this point that the company is just as interested in making quiet gear sets as are the passenger car transmission builders. Obviously this stems from the fact that a "quiet" gear set implies good alignment and perfection of tooth contact under load, a combination sure to yield maximum service life. The latest technique at Massey-Harris designed to assure gear quietness is found in the recent adoption of Vapor-Blast. The large Vapor-Blast cabinet shown here is used for surface conditioning of gear teeth on all spur gears. It produces a beautiful satin finish free from roughness, already instrumental in reducing rejections. In its

(Turn to page 62, please)

A corner of the heat treating department showing an installation of the latest type Holcroft gas carburizing furnace for transmission gears



Inflation and Depreciation

Under-Depreciation of Manufacturing Industries' Plants, at Present Replacement Costs, is 20 per cent Greater Than Total Net Profits for Past 18 Years

IN the Annual Statistical Issue of Automotive Industries, published March 15, there appeared an article, "Profits in 1947 Lower than in 1940 Relative to National Income." In that article it was pointed out, by means of a table and amplifying text, that disposable corporate profits in the United States, excluding those of banks and insurance companies, were only 4.9 percent of national income in 1947 while in 1940 they were 7.4 percent. The article, with its accompanying table, also showed the cash requirements for expansion and dividends together with a breakdown showing how such costs were financed in 1947 and 1940.

There is presented here a further study of the effects of inflation on corporate financial operations with particular reference to under-depreciation and the increased dollar cost of new construction and producers' durable equipment. This study was made by the Chief Statistician of a large corporation subscribing for Automotive Industries. It covers the manufacturing industries only, excluding public utilities.

This study finds that from 1929 through 1947, total investment of the manufacturing industries for

plant and equipment amounted to slightly more than \$112 billions. Replacing these plants and equipment at the December, 1947 cost would amount to more than \$187 billions, so that the increased cost on this basis would be more than \$75 billions.

When taking the total investment from 1929 through 1946, it is found that new plant and durable equipment put in place by the manufacturing industries amounted to slightly more than \$95 billions. To replace those plants and the new equipment on the basis of December, 1946 costs, it would be necessary to increase this amount by more than \$53 billions for a total of about \$149 billions. The amount of underdepreciation, therefore, is represented by the figure \$53 billions.

The difference between increased replacement costs effective December, 1947 as against December, 1946, when excluding investment in plant and durable equipment during the year 1947, amounts to \$20.8 billions and represents a measure of higher costs to the manufacturing industries caused by the inflationary conditions during the year 1947.

Net income, after all taxes, amounted to \$53.8 billions for the total (*Turn to page 62, please*)

TABLE I
MANUFACTURING INDUSTRIES*
INDEX OF CONSTRUCTION COSTS AND ACTUAL
COST FOR NEW CONSTRUCTION AND PRO-
DUCERS' DURABLE EQUIPMENT

Construction Cost Index		Total New Construction and Producers' Durable Equipment		In-creased Costs	
Dec., 1947		In		In	
Index (435.0)		Current Dollars		Dec., 1947 Dollars	
Year	1913=100	As % Of Each Year	Current Dollars	Dec., 1947 Dollars	Increased Costs
1929	207.0	210.1	\$ 7,577	\$ 15,919	\$ 8,342
1930	202.9	214.4	5,457	11,700	6,243
1931	181.4	239.9	3,396	8,147	4,751
1932	157.0	277.1	1,957	5,423	3,466
1933	170.2	255.6	1,961	5,012	3,051
1934	198.1	219.6	2,656	5,833	3,177
1935	196.4	221.4	3,337	7,388	4,051
1936	206.4	210.7	4,401	9,273	4,872
1937	236.3	184.1	5,387	9,917	4,530
1938	235.4	184.8	3,856	7,126	3,270
1939	235.8	184.5	4,508	8,317	3,809
1940	242.9	179.1	6,000	10,746	4,746
1941	259.3	167.8	8,581	14,399	5,818
1942	277.6	156.7	7,173	11,240	4,067
1943	290.9	149.5	4,585	6,855	2,270
1944	299.4	145.3	4,690	6,815	2,125
1945	308.9	140.8	6,766	9,527	2,761
1946	351.2	123.9	E-12,897	E-15,979	E-3,082
1947	411.6	105.7	E-16,995	E-17,964	E- 969
Total					
19			112,180	187,580	75,400
Years					

(SOURCE: Engineering News Record and Survey of Current Business, U. S. Dept. of Commerce)
E—Estimate
*—Excluding Public Utilities

TABLE II
MANUFACTURING INDUSTRIES*
INDEX OF CONSTRUCTION COSTS AND ACTUAL
COST FOR NEW CONSTRUCTION AND PRO-
DUCERS' DURABLE EQUIPMENT

Construction Cost Index		Total New Construction and Producers' Durable Equipment		In-creased Costs	
Dec., 1946		In		In	
Index (381.7)		Current Dollars		Dec., 1946 Dollars	
Year	1913=100	As % Of Each Year	Current Dollars	Dec., 1946 Dollars	Increased Costs
1929	207.0	184.4	\$ 7,577	\$ 13,972	\$ 6,395
1930	202.9	188.1	5,457	10,265	4,808
1931	181.4	210.4	3,396	7,145	3,749
1932	157.0	243.1	1,957	4,757	2,800
1933	170.2	224.3	1,961	4,399	2,438
1934	198.1	192.7	2,656	5,118	2,462
1935	196.4	194.3	3,337	6,484	3,147
1936	206.4	184.9	4,401	8,137	3,736
1937	236.3	161.5	5,387	8,700	3,313
1938	235.4	162.1	3,856	6,251	2,395
1939	235.8	161.9	4,508	7,298	2,790
1940	242.9	157.1	6,000	9,426	3,426
1941	259.3	147.2	8,581	12,631	4,050
1942	277.6	137.5	7,173	9,863	2,690
1943	290.9	131.2	4,585	6,016	1,431
1944	299.4	127.5	4,690	5,980	1,290
1945	308.9	123.6	6,766	8,363	1,597
1946	351.2	108.7	E-12,897	E-14,019	E-1,122
Total					
18			95,185	148,824	53,639
Years					



This 1949 Mercury Sport Sedan typifies the low, graceful lines of the new Mercury model.

Entirely New '49 Mercury

Latest Model in Four Body Types Presents Sweeping Changes in Styling and Mechanical Components. Major Chassis Improvements Include Independent Front Suspension with Coil Springs, Longitudinal Semi-Elliptic Springs at Rear, Hotchkiss Drive, Hypoid Rear Axle, More Powerful V-8 Engine, New K-Type Frame and Extra Low Pressure Tires.

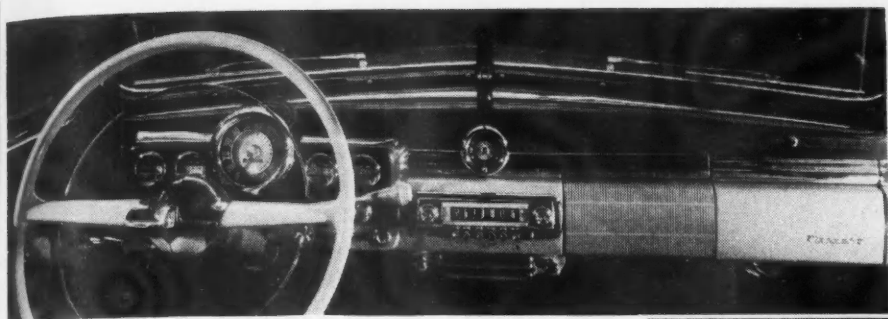
AS had been expected, sweeping styling and mechanical changes have been made in the 1949 Mercury which went on display to the public April 29. In general, it has the lower, wider, flowing lines of the latest styling, vastly improved riding comfort through new suspension and adoption of Hotchkiss drive, a new engine with greater horsepower, and more window area for better vision.

Outside of the styling, which is the type that has been considered radical, but now is becoming conven-

tional with the introduction of new models in the industry, the greatest departure from previous models is in the new chassis design. After more than four decades, Ford is abandoning the transverse leaf springing at the front and rear in all its 1949 models. The Mercury has swinging arm, individual front wheel suspension on independent coil springs with airplane type direct action shock absorbers installed inside the springs. Rear suspension consists of two longitudinal semi-elliptic leaf springs with full length

COMPARATIVE SPECIFICATIONS FOR 1949 AND 1948 MERCURY

	1949	1948
Wheelbase (in.)	118	118
Curb Weight (lb)	3600	3445
Overall Length (in.)	206.7	201.75
Overall Width (in.)	76.96	73.25
Overall Height (in.)	62.95 (loaded)	69-1/16 (unloaded)
Front Tread (in.)	58.5	58
Rear Tread (in.)	60	60
Engine Displacement (cu in.)	255	239.4
Max. Horsepower	110 at 3600 rpm	100 at 3800 rpm
Compression Ratio	6.8 to 1	6.75 to 1
Choke	Automatic	Manual
Brakes	Duo-servo Hydraulic	Hydraulic
Front Springs	Individual Coil	Transverse Leaf
Rear Springs	Longitudinal semi-elliptic	Transverse Leaf
Drive	Hotchkiss	Torque Tube and Radius Rods
Rear Axle	Hypoid	Bevel Gear
Tire Size	7.10-15 four-ly extra-low pressure	6.50-15
Front Seat Width (in.)	57.1	50
Front Seat Shoulder Width (in.)	57.5	54
Inside Width of Body at Center Pillar at Belt Line (in.)	58.3	55.87
Rear Seat Width (in.)	60.7	58



(Left) The 1949 Mercury instrument panel.

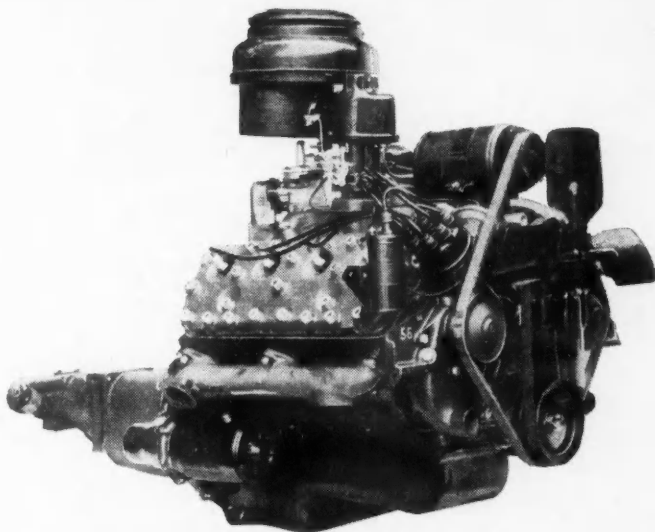
liners between leaves, and rubber bushed shackles to eliminate need for lubrication during life of the car. Shackles are the tension type, which together with the inverted-V mounted shockabsorbers at the rear, eliminates the conventional stabilizer bar. The new X-type riveted and welded frame has special K-members for added strength and rigidity. Front suspension alignment has been greatly simplified by providing separate adjustments for both camber and caster.

Another radical chassis departure for Mercury is adoption of Hotchkiss drive in place of the torque tube and radius rod drive used for so many years by Ford. Lincoln-Mercury engineers say that the new drive not only provides a much softer drive, but effects a considerable reduction in upsprung weight, giving improved riding comfort. Another important chassis change is abandonment of the bevel gear in favor of the hypoid rear axle. This change permits use of a lower car floor without increasing the size of the drive shaft tunnel. Also interesting in the new Mercury is the design of the rear wheel attachment. The hub is eliminated and the wheel is attached directly to the flanged axle end, permitting the wheel to be removed by dropping it almost straight down instead of outward and down.

While the new V-8 power plant in the 1949 Mercury is more powerful than in previous models, it is not as radically changed as the chassis. It is designed for exclusive use in the



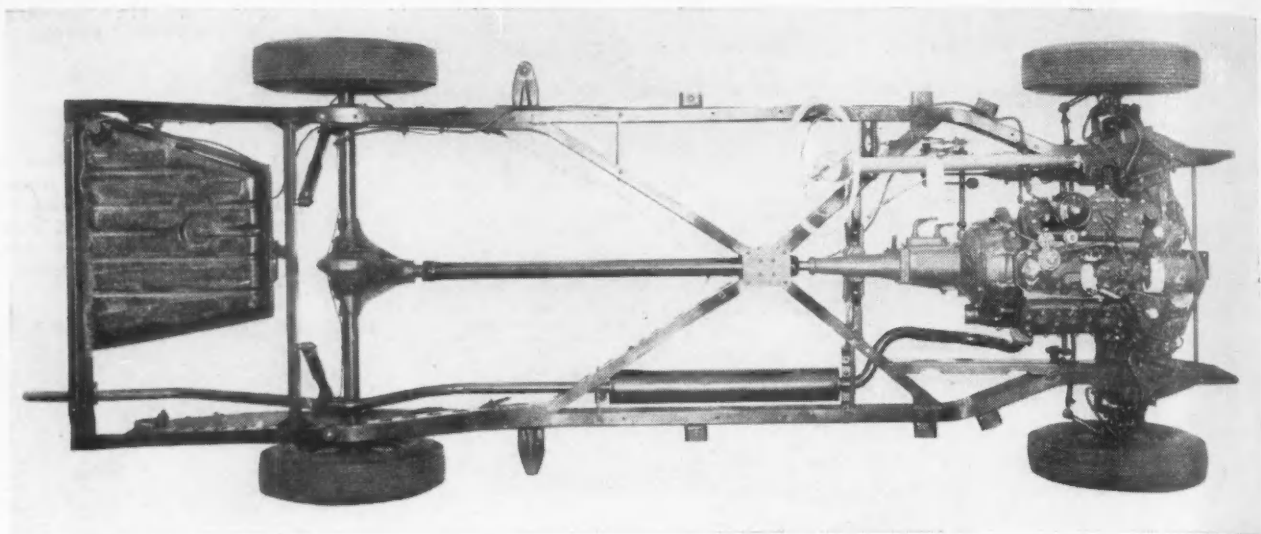
(Below) Front end treatment of the '49 Mercury incorporates a newly-designed grille, massive bumper and bumper guards, topped by a winged radiator ornament.



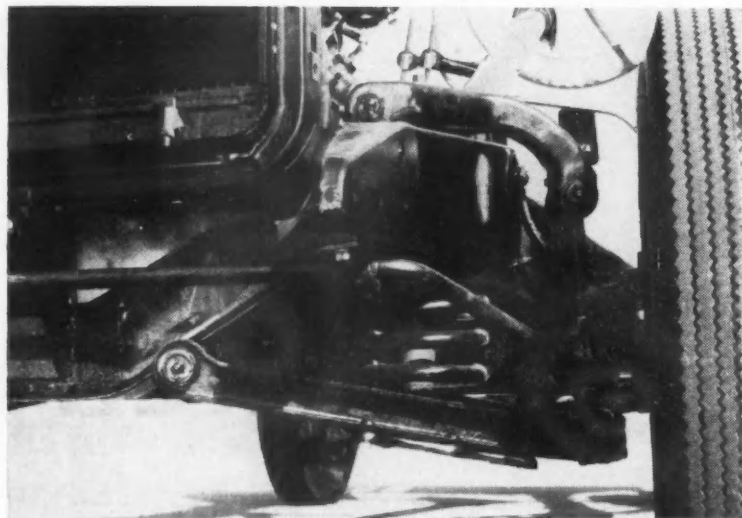
Front three-quarter view of the new 110-hp Mercury engine. Note the new location of the distributor that greatly improves accessibility.



(Left) The 1949 Mercury Station Wagon has an all-steel body with wood panels superimposed on the latter.



(Above) Plan view of the 1949 Mercury chassis showing the new K-type frame, front and rear suspension, engine mounting, hypoid rear axle, Hotchkiss drive, and 110-hp engine. Chassis construction of the two 1949 Lincoln models (see April 15 issue, *Automotive Industries*) is similar except they are longer and heavier.

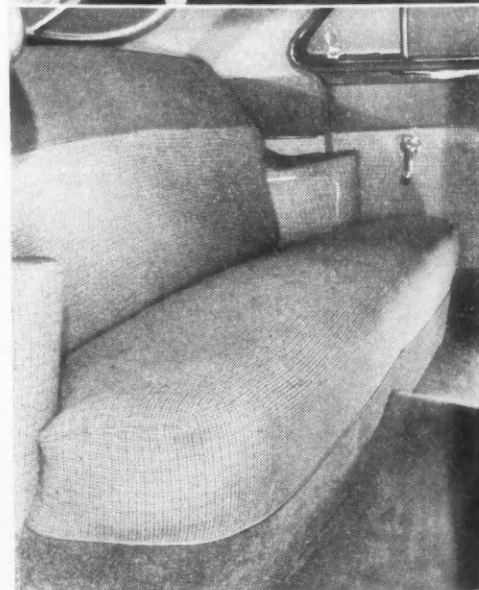
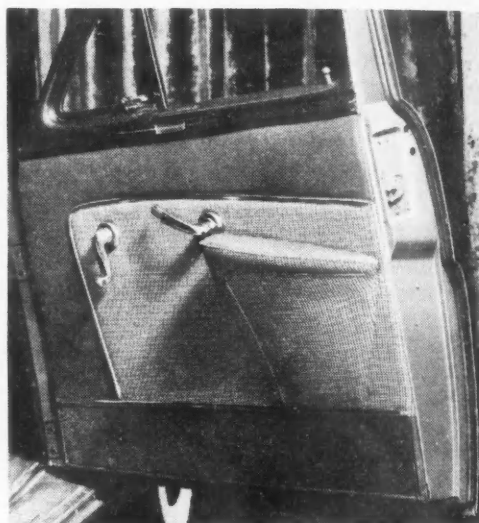


Closeup of left side of front wheel suspension showing direct acting shock absorber mounted inside the coil spring. Front suspension of the 1949 Lincoln and Lincoln Cosmopolitan models are similar to this Mercury design.

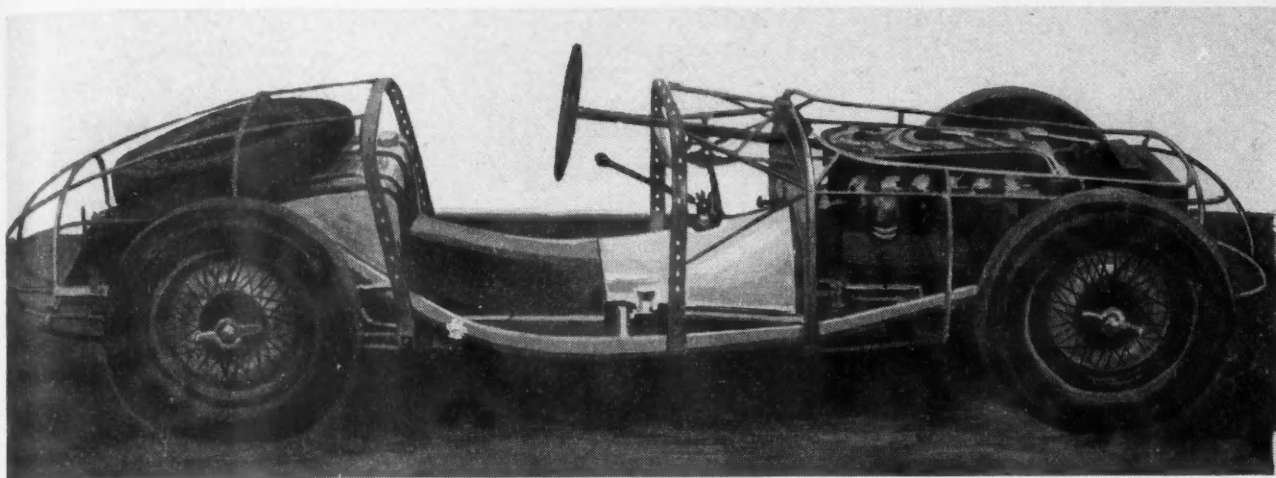
Mercury and develops 110 hp at 3600 rpm, compared with the former engine which developed 100 hp at 3800. Bore is the same, 3 3/16 in., but the stroke has been lengthened 1/4 in. to 4 in. Displacement in the new engine has been increased from 239.4 cu. in. to 255. The compression ratio has been stepped up to 6.8 from 6.75. The cooling system has been redesigned to direct the flow of water from the rear of the block to the front, and larger water pumps with ball bearings have been added. A reduction of 12 degrees in cylinder head hot spot temperatures is claimed for these improvements.

For the first time, Mercury will have an automatic choke in place of the manual device. Another improvement in the fuel system is adoption of the right-angle type concentric carburetor float bowl in the air stream between the air cleaner and carburetor, which keeps it cool and prevents vapor lock. Intake manifold branches also have been repositioned so that they are horizontal when the engine is tilted five degrees to the horizontal in (*Turn to page 72, please*)

Interior of front door and the arm rest design.



Rear seat with green-checked broadcloth.



Side view of the new Italian racer showing its tubular frame construction.

155 MPH Maserati Racing Car

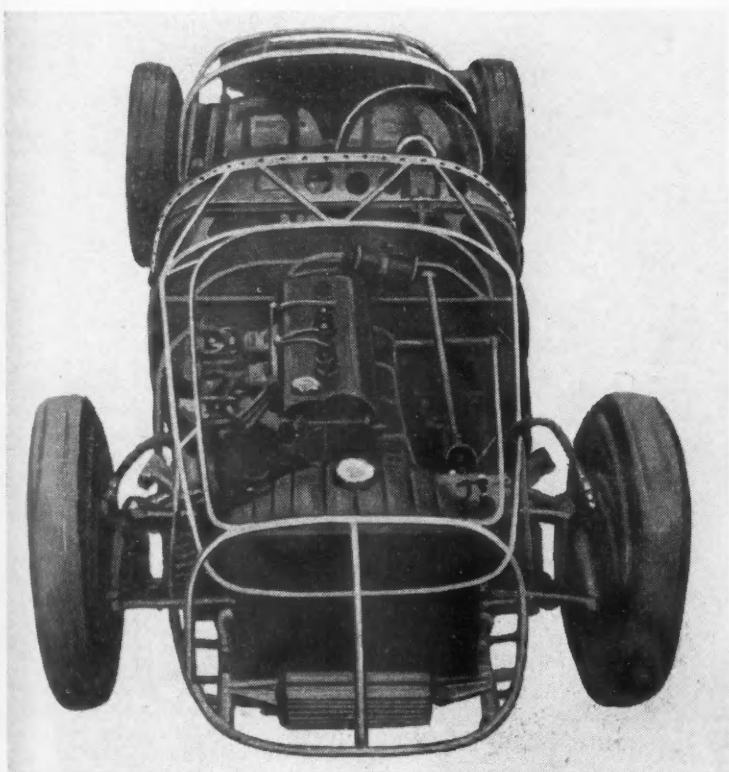
A NEW six-cylinder racing car, the Maserati A6G, made its appearance recently in Italy when it demonstrated not only excellent maneuvering characteristics and exceptionally good road-holding ability, but also a racing power between 120 and 130 hp for a displacement of 120½ cu. in.

The new Maserati car features a tubular-type frame, as shown in the accompanying drawings,

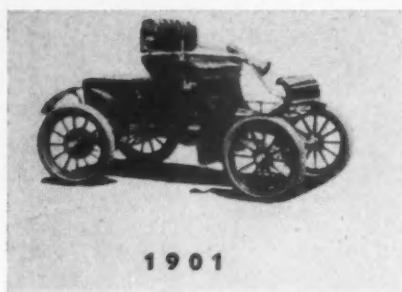
which results in a light and rigid vehicle. The weight, dry and empty, is only 1390 lb. The engine is a six-cylinder overhead valve type with a bore of 2.84 in. and a stroke of 3.19 in. As can be seen from the drawing, it is slightly offset from the centerline of the vehicle. Normal engine speed is 5200 rpm, and the compression ratio is 6.25 to 1. Three Weber carburetors, two fuel tanks and a Roots supercharger

are used. The pistons are of forged aluminum and the connecting rods are of cast iron. The engine block is of cast iron with an aluminum head which has hemispherical combustion chambers. Pressure lubrication is utilized, through a double oil pump.

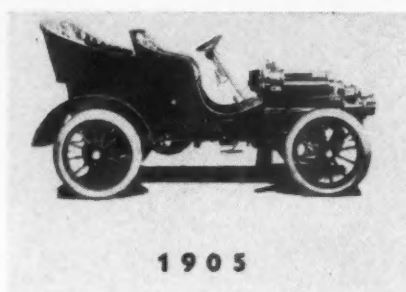
Suspension is independent on all four wheels, using coil springs and arms forming a transverse parallelogram in front and semi-elliptic springs in the rear. Hydraulic shock absorbers are provided. The transmission is of the four-speed type, with a single-disk dry clutch. The wheelbase is 98½ in.; front tread is 49 in.; and the rear tread is 47 in. Maximum speed is claimed to be 155 mph.



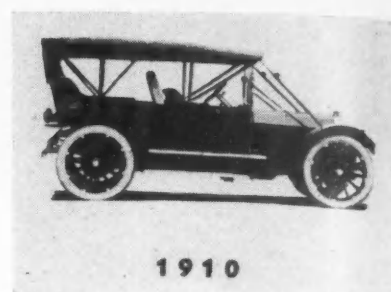
Drawing of the Maserati A6G racing car.



1901



1905



1910



1897

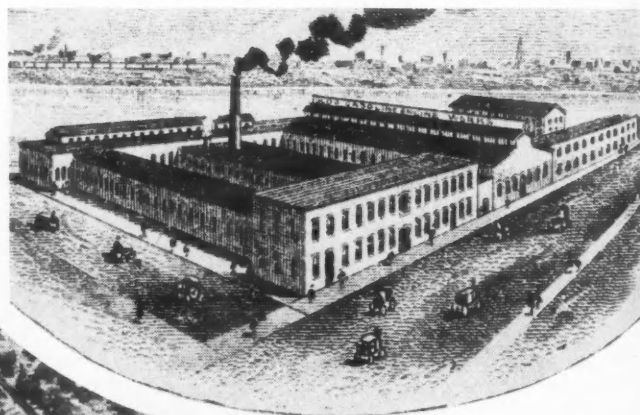
Fifty Years of

By Leonard Westrate

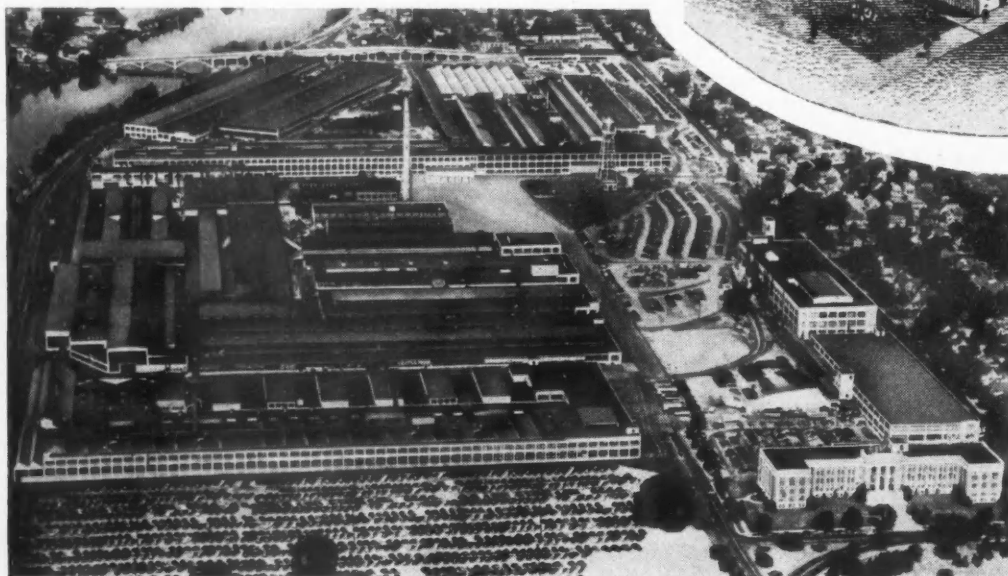
OLDSMOBILE Division of General Motors Corp. this year is observing its golden anniversary, commemorating a half century of existence as an automobile manufacturer. To be strictly factual, the anniversary does not mark 50 years as a GM division. Rather, it observes the founding a half-century ago of the parent company from which the current Oldsmobile organization is descended through an intermediary company. The golden anniversary is not on a calendar basis, but is encompassed by the 12 months period between Aug. 21, 1947 and the same date this year.

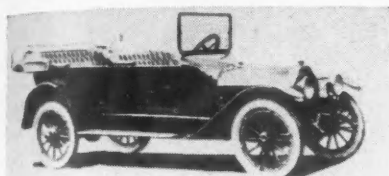
In 1886, a young man in Lansing, Mich., built a crude steam carriage. He was Ransome E. Olds, son

of Pliny Olds, Lansing engine builder. The car eventually was sold to a London firm in 1893, and logically could be said to be the first Oldsmobile made and sold, although the vehicle did not carry that name. However, by that time gasoline engines had come into more common use, and Olds turned to that kind of power for his second car, which he completed in 1897 with the help of Frank Clark, son of a carriage builder, who furnished the chassis. On August 21 of that year, the Olds Motor Vehicle Co. was or-

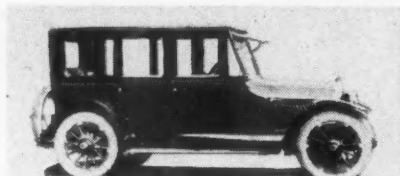


Main plant of the Oldsmobile Division, General Motors Corp., Lansing, Mich., as seen from the air, looking west. The plant covers 96 acres in southwest Lansing and provides more than three million sq ft of floor space. The Oldsmobile forge plant, also located at Lansing, covers 53 acres. Taken from a portion of a letterhead, the inset shows the Olds Gasoline Engine Works, located on River Street, Lansing. In a portion of this plant R. E. Olds built his first Oldsmobile, in 1897, fifty years ago.

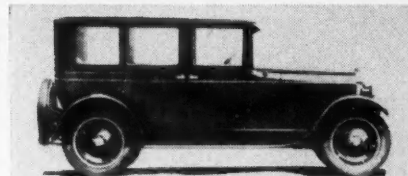




1915



1920

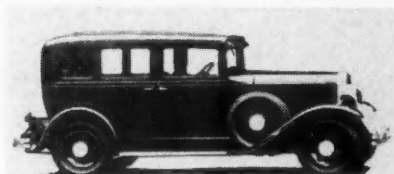


1925

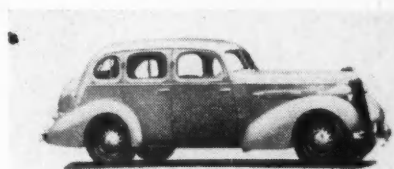
Merry Oldsmobiles

ganized with a capital of \$50,000. R. E. Olds was principal stockholder and general manager. The company ultimately built four cars, according to one account. These were sold in Grand Rapids, Mich., Chattanooga, Tenn., and in Florida, indicating wide distribution right from the outset. One of the cars now is in the Smithsonian Institution.

Although the cars apparently operated fairly well, they did not catch on with the public too well. Accordingly, young Olds went in search of Detroit capital and found it in the person of S. L. Smith, a Michigan copper magnate who had both the means and daring for the investment. The account here is clouded a bit as to whether Olds was running the automobile building and engine building projects as the same or separate businesses. However, F. L. Smith, son of the financier and an active participant in the company, relates that it was one business. He points out that capital was raised for the successor company, the Olds Motor Works, on the basis of the dividend record of the old engine building company and the sure-fire field for gasoline engines. At any rate the new company was organized in 1899 with fully paid-in capital of \$350,000. Of this amount, (Turn to page 68, please)



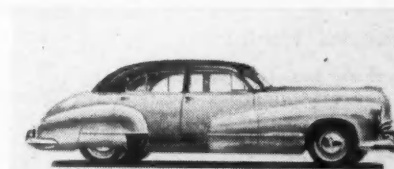
1930



1935



1940



1947



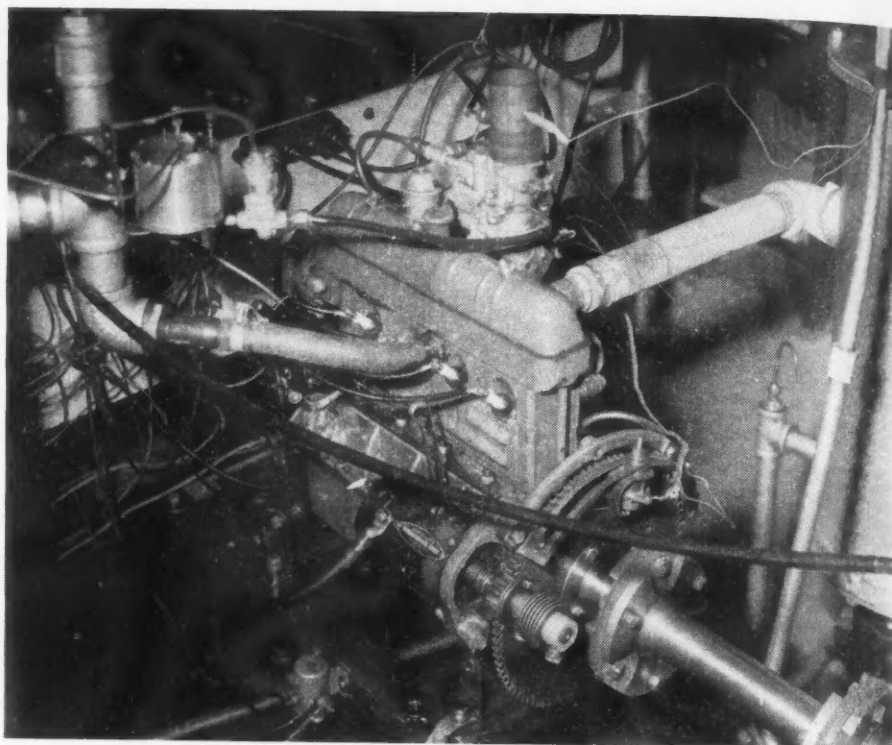
1948

HIGHLIGHTS OF OLDSMOBILE'S HISTORY

Year	Noteworthy Events
1897	Olds Motor Vehicle Co., incorporated at Lansing, August 21, 1897. First Oldsmobile built. Two employees.
1898	Company continues experimental work. Builds second car.
1899	Olds Motor Works organized in Detroit. Twelve employees.
1900	Quantity production system. 425 cars built during year at Detroit factory. Employment at 216 mark.
1901	First Curved Dash Runabout built. Fire destroys patterns—production delayed. Although Detroit plant was rebuilt, further expansion on this site was deemed inadvisable. To provide for greater production, however, a new plant was rebuilt in Lansing.
1902	Both Detroit and Lansing plants were used to produce Curved Dash Runabouts. Production—2500; employment—415.
1903	Oldsmobile "Pirate" set world's speed record—five miles in 6½ min.
1904	High mark in production achieved—5508 Curved Dash Runabouts; 500 workers.
1905	Detroit plant abandoned and Lansing became home of Oldsmobile. Peak production of 36 cars per day reached; 612 employees. Oldsmobile won first transcontinental race—"Old Scout" completed trip in 44 days. Gus Edwards wrote "In My Merry Oldsmobile."
1906	First medium priced four-cylinder car produced.
1907	Nickel plating used for first time. Employment dropped to 215 during panic this year.
1908	Olds Motor Works becomes unit of General Motors. First six-cyl. model introduced at Madison Square Garden. Oldsmobile won Glidden Reliability tour. Employment up to 500.
1909	First Oldsmobiles with closed bodies built. Employees—1052.

(Turn to page 70, please)

Crosley engine test set-up with injector in upper left-hand corner



Boosting Engine Performance with Alcohol-Water Injection

Tests Results Show Possibilities of Use with Low Octane Gasolines in High Compression Automobile Engines

By J. C. Porter, W. B. Roth, and Richard Wiebe

Northern Regional Research Laboratory,
Bureau of Agricultural and Industrial Chemistry,
U. S. Department of Agriculture

THE use of alcohol-water or water injection as a means of raising the "effective" octane number of gasoline has received increasing attention in recent years, as shown in the appended partial bibliography. Much of this work has been devoted to the use of injection in aircraft engines for take-off and combat operations, but more and more interest has been shown lately in its possible application to automobile engines.

Results reported here are part of a comprehensive program for investigating the practical aspect of alcohol-water injection in automobile engines. The experiments were conducted to emphasize two points; first, to renew attention to the possibility of using alcohol-water injection for high compression engines with a consequent saving of high octane gasoline; and second, to investigate the specific effect of the alcohols in the "coolant" mixture.

The word "injection" in this case is really a misnomer. Most of the present designs of injectors are of the nature of auxiliary carburetors.

TABLE I

Comparison of Injection Rate Required to Allow Only Trace Knock at Full Throttle Using Various Coolants with Regular Grade Gasoline (73 octane number) in a 1947 Crosley Engine with 9 to 1 CR and Sp. Adv. Automatic, Set for Maximum Power

Coolant Injected (per cent by volume)	Lb coolant per lb fuel*	
	2600 rpm	4000 rpm
40% ethanol		
10% methanol		
50% water	0.35	0.30
80% ethanol		
20% water	0.27	0.24
60% isopropanol		
40% water	0.31	0.28
90% (50% ethanol, 50% water)		
10% aniline	0.31	0.28
50% acetone		
50% water	0.44	0.34
80% acetone		
20% water	0.31	0.26
Isocetane+2 cc T.E.L. per gal	0.60 plus†	...

* As given by the injector with rate set at 2000 rpm.

† Engine flooded, loss of power.

The injector used in these experiments consisted of a variable jet located slightly above the butterfly valve, a needle valve with attached spring-loaded piston inside a cylinder connection to the intake manifold, and an auxiliary reservoir with float for maintaining an approximately constant head of between 2½ and 3½ in. of liquid at the jet opening. This variable jet is adjusted manually to give the required injection rate. When the manifold pressure drops below approximately 21 in. Hg absolute, the resulting vacuum acts upon the spring-loaded piston and causes the needle valve to close, shutting off the "coolant" supply, since at lower manifold pressures detonation will not occur even without coolant.

The choice of engines for these experiments depended largely on their availability. Most of the tests reported were made with a 1947 Crosley engine (CC-47), since its compression ratio could be changed most readily over a more extended range than that of other makes. However, extensive tests have also been made with Plymouth and Chevrolet engines but only a few results obtained with the latter will be shown.

Fig. 1 shows not only the advantages of the higher thermal efficiency obtainable at higher compression ratios, but also indicates that in this particular engine a regular gasoline (73 octane number) with alcohol-water injection is equivalent to a 90 octane number (motor and research number) gasoline which fulfills the octane requirements of the engine. All experiments were run at trace knock with automatic spark advance set initially for maximum power.

In Table I the ratio of lb coolant per lb fuel to allow only trace knock are given for a number of coolant fluids when regular gasoline is used at 9 to 1 compression ratio. The amounts tabulated are not necessarily the minimum required, but were the ones obtained when the injector was set for trace

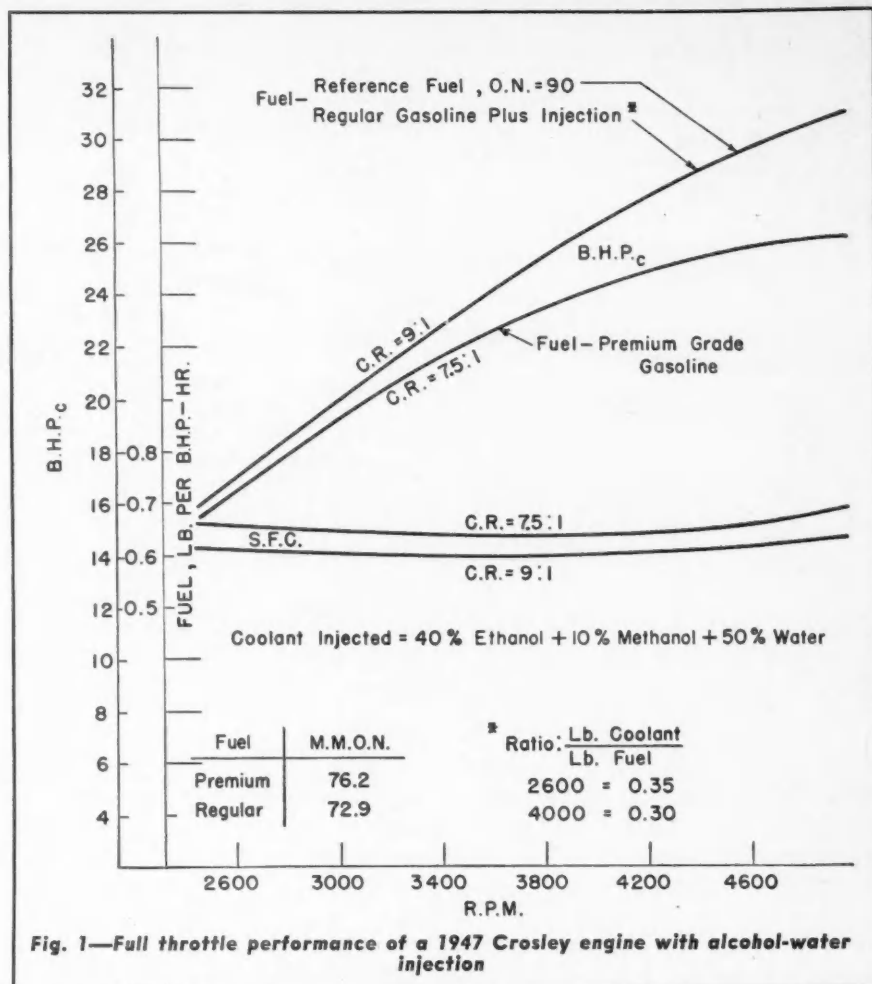


Fig. 1—Full throttle performance of a 1947 Crosley engine with alcohol-water injection

Coolant Injected (per cent by volume)		Fuel		Motor Method Octane Number Plus 1 cc per T.E.L. per Lb Fuel*		
				Clear	Gal	Lb Coolant per Lb Fuel*
				Clear	Gal	Lb Coolant per Lb Fuel*
80% ethanol	20% water	Regular	72.9	74.4	0.27	0.24
80% ethanol (plus 3 cc T.E.L. per gal)	20% water	Regular	72.9	74.4	0.27	0.24
80% ethanol	20% water	Reference	73.0	84.8	0.27	0.24
80% ethanol (plus 3 cc T.E.L. per gal)	20% water	Reference	73.0	84.8	0.23	0.20
80% ethanol	20% water	Reference	68.8	81.2	0.29	0.27
80% ethanol (plus 3 cc T.E.L. per gal)	20% water	Reference	68.8	81.2	0.25	0.24
60% isopropanol	40% water	Regular	72.9	74.4	0.31	0.28
60% isopropanol (plus 3 cc T.E.L. per gal)	40% water	Regular	72.9	74.4	0.32	0.27

* As given by the injector with rate set at 2000 rpm.

Fuel (per cent by volume)		Motor Method Octane Number	Research Method Octane Number	Lb Coolant per Lb Fuel†
Regular Grade	72.9	75.0	0.35	0.30
Premium Grade	76.2	81.5	0.29	0.22
Reference Fuel	90.0	90.0	none	none
50% regular	79.8	89.7	none	none
50% benzene	74.5	82.4	0.20	0.15
75% regular	75.0	86.6	0.29	0.22
25% benzene				
25% isooctene				

† Coolant used: 40% ethanol + 10% methanol + 50% water. Ratio as given by the injector with rate set at 2000 rpm.

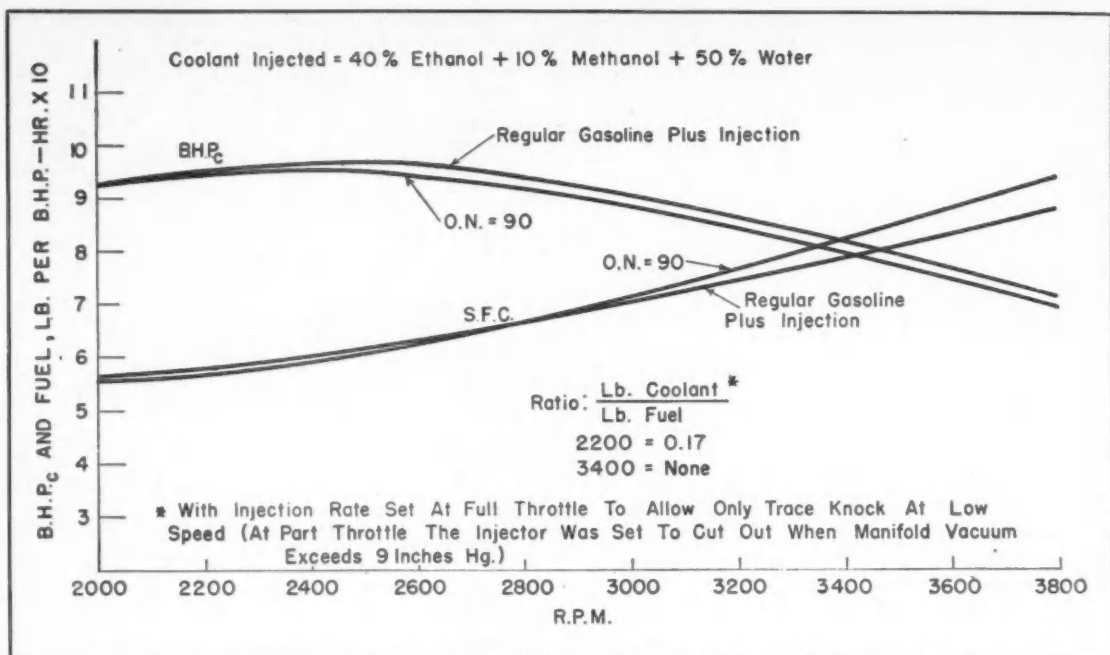


Fig. 2—Part throttle performance of a 1947 Crosley engine with alcohol - water injection at compression ratio of nine to one

knock operation at 2000 rpm. The data must be interpreted as being largely relative. Referring to Table I, the results show that increasing the amount of ethanol lowers the amount of coolant necessary to prevent detonation. In spite of the high octane number of acetone (3.1 and 3.4 ml of T.E.L. for motor and re-research octane numbers, respectively), a 50:50 blend of acetone and water was less effective than one containing a 40:10:50 blend of ethanol-methanol-water. (Methanol was added only to serve as a denaturant; however, its effectiveness in automobile engines is approximately equal to that of ethanol.) The increased amount of coolant necessary might be accounted for by the lower heat of vaporization of acetone even though this argument appears doubtful in the presence of so much water. Leaded iso-octane alone as a coolant was not sufficient since the resulting fuel-air mixture became over-rich before it prevented detonation.

The addition of lead to the coolant is naturally only effective if the fuel itself has a good lead susceptibility. This is shown in Table II. However, the benefit is not commensurate with the amount of lead added, which in part may be caused by poor manifold distribution of coolant. That fuel sensitivity is an important factor is brought out in Table III. Sensitive fuels having a motor method rating considerably below 90 octane number, such as 25 or 50 per cent benzene blended with regular gasoline, either require no injection or a smaller amount.

Injection of water alone at 9 to 1 compression ratio did not suppress detonation even with an 80 octane number base fuel, since flooding ensued. Retarding the initial spark setting 11 deg lower than for maximum power at higher speeds was not sufficient to overcome detonation. Even with a base fuel of 85 octane number no significant improvement resulted.

Fig. 2 shows the results of part throttle operation. At approximately 25 mph (2200 rpm) in high gear,

an injection rate of 0.17 lb coolant per lb fuel was still required although none was required at the higher speeds. Both power and specific fuel consumption were more favorable on the average for regular gasoline with injection than for the 90 octane gasoline.

The behavior of alcohol-water injection in a standard automobile engine is shown in Figs. 3 and 4. A third-grade gasoline of 54 octane number with alcohol-water injection gave performance slightly superior to that of a regular gasoline.

The use of an auxiliary injection device may seem to be an extra gadget, but it may turn out to be an economical necessity in the near future. Recent published notes in this journal (AUTOMOTIVE INDUSTRIES, Feb. 1, p. 36), and in newspapers have announced experimental work by the Socony Vacuum Oil Co. on the use of two fuel grades. The principle involved is basically the same as alcohol-water injection. Several articles have been published recently indicating opposition to the use of higher compression engines for new model cars because such a step is said to complicate still further the already tight supply problem of high octane fuel. However, the use of higher compression ratios for the purpose of higher thermal efficiencies and consequent greater fuel economy justifies every effort spent for its accomplishment. There appears to be no difficulty in the construction of engines to withstand the higher peak pressures and even some present-day models have been run at higher compression ratios for long periods without apparent detrimental effects. The use of any auxiliary device, fuel or coolant, must, of course, be preceded by thorough tests before it is offered to the public. Such problems as wear, corrosion, crankcase dilution, and the like, must be investigated.

A partial bibliography of literature on alcohol-water and water injection follows:

(Turn to page 60, please)

Fig. 3—Full throttle performance of a 1942 Chevrolet truck engine with ethyl alcohol-water injection. Spark advance automatic and set for trace knock at full throttle low speed

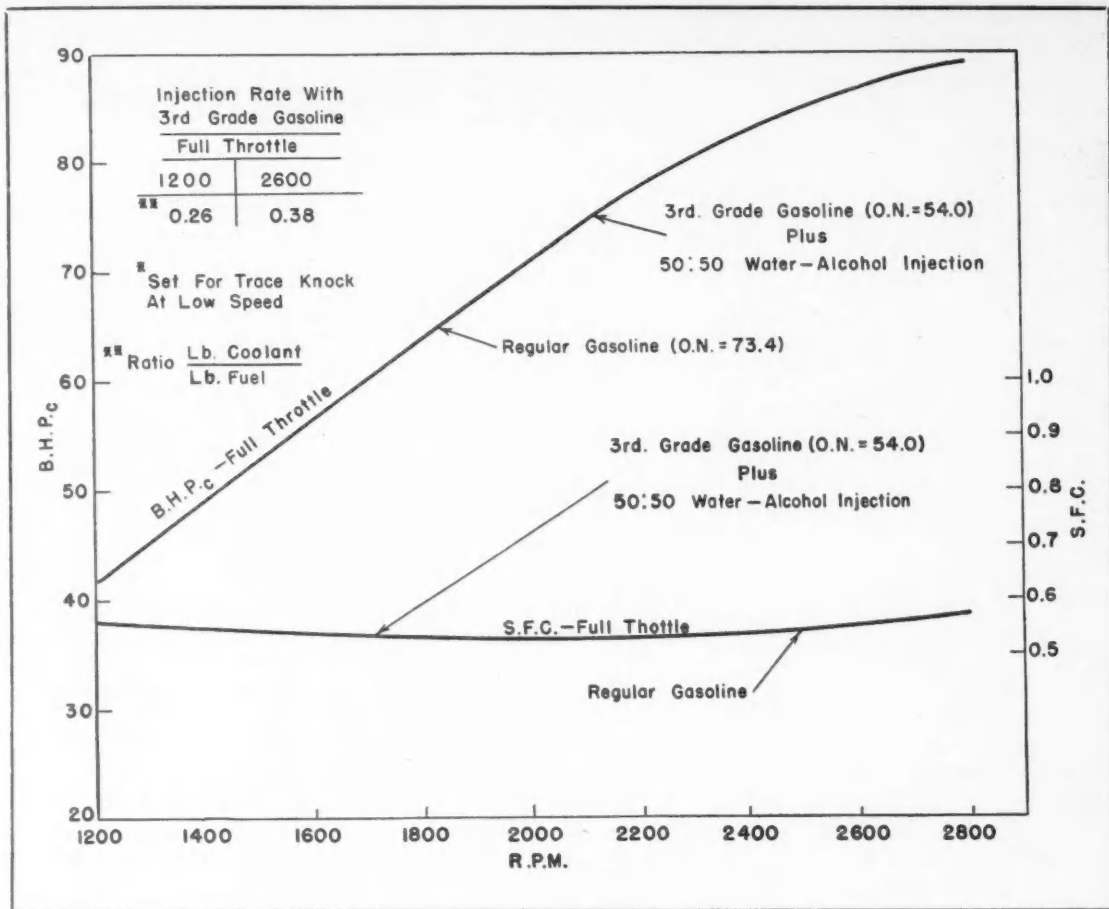
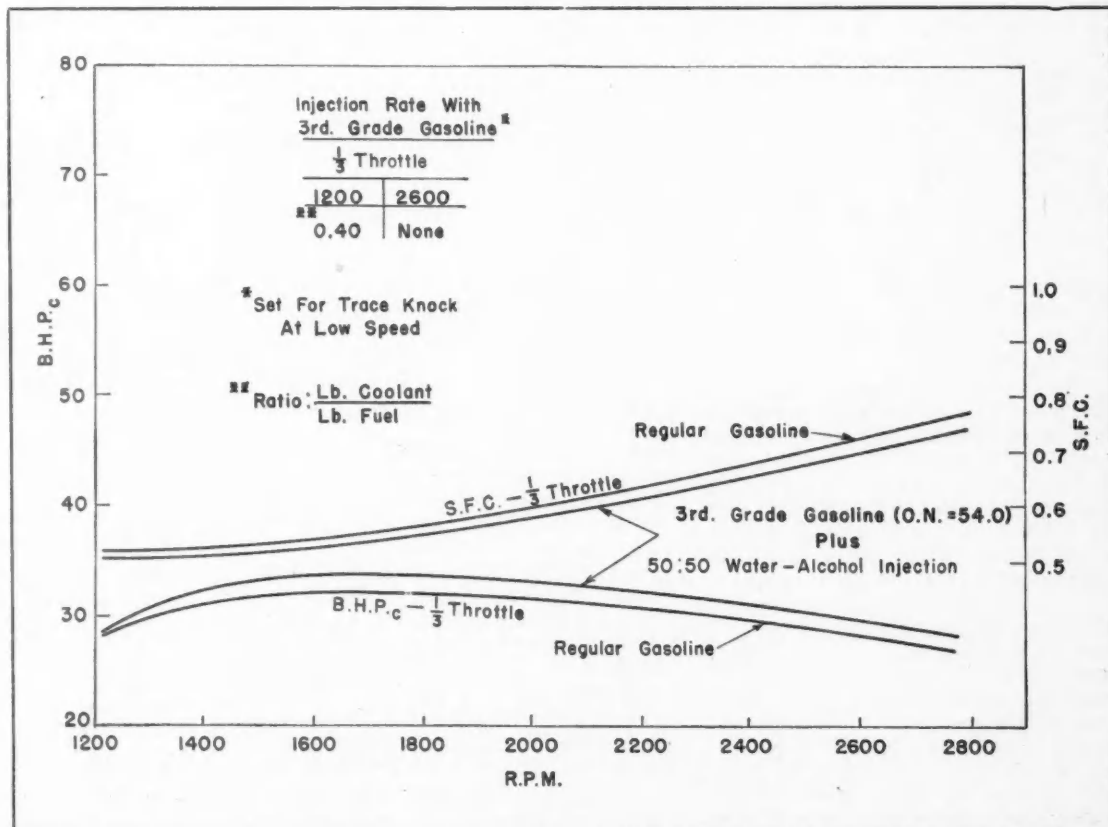


Fig. 4—Part throttle performance of a 1942 Chevrolet truck engine with ethyl alcohol-water injection. Spark advance automatic and set for trace knock at full throttle low speed



SAE Passenger Car and

FROM the standpoint of timeliness and stimulating approach, the papers presented at the first postwar SAE National Passenger Car and Production Meeting held in Detroit early in March established a new high in technical content.

The influence of younger engineers in establishing a new approach to familiar problems was shown in two papers on stress analysis: W. E. Rice and R. O. Ellerby, GMC Truck and Coach Div., discussed the determination of dynamic loads in large coach structures; and P. O. Johnson and R. G. Heyl, Jr., Fisher Body Div., treated stress engineering as applied to the automobile body.

The session on riding comfort brought to the fore the work done by L. E. Muller of Buick in the influence of scientifically designed motor mounts, while R. N. Janeway of Chrysler showed his deftness in analysis by correlating the available data on the tolerance of human subjects of amplitude and frequency of vibration of the motor car. Discussion of the latter paper stressed the need for combining the efforts of engineers, physicians, and psychologists in the attack on this problem. H. M. Jacklin announced at this session the commercial availability of a new form of accelerometer capable of response to six modes of vibration.

The production sessions shed light on developments of major significance. R. H. McCarroll of Ford Motor Co., led off by showing that production process control was of greater importance than quality control at the end of the line. He also mentioned for the first time the adoption at Ford of the hot extrusion forging process which holds promise of enormous cost savings and improvement in quality. J. H. Friedman of the National Machinery Co., exhibited press forging samples made on the Maxi-Press by combinations of cold heading, rolling, and hot extrusion. The reduction in the amount of raw materials handled by these techniques is remarkable.

The role of aluminum in the present steel shortage picture was discussed by a team of experts from Alcoa: J. H. Dunn, E. G. Kort, and G. O. Hoglund. It was made plain that a shortage exists in aluminum as well as in steel, and that this is aggravated by the difficulty in planning expansion owing to the transient nature of current applications of aluminum in motor cars. Alcoa prefers to concentrate on applications that promise sufficient economy to replace steel permanently.

A challenge to the automobile industry was found in the paper on highway safety; presented by Maxwell Halsey of the Michigan State Safety Commission. Packed with com-

Technical Papers Cover Latest Developments in Aluminum Body Stampings, Modern Welding Procedures, Measuring Cylinder Wear, Eliminating Vehicle Vibration, Stress Engineering, Buick Dynaflow, Low Weight Forgings, and Other Interesting Subjects

mon sense and specific recommendations, the paper merits study by engineers and management alike. At the same session V. J. Roper of Nela Park, General Electric Co., touched on headlighting with minimum glare in a discussion that left no doubt that some improved form of Polaroid headlighting provides the only reasonable solution.

As might be expected, the disclosure of the design detail of the Buick Dynaflow transmission by C. A. Chayne drew the largest crowd of this meeting. At the same session, M. E. Estey of Perfect Circle Co., described the new cylinder contour gage developed by his organization.

A comprehensive paper on the techniques involved in the conception and reduction to practice of body design was presented by W. A. Graf of The Budd Co. Allied to this subject was the discussion of modern welding techniques in building motor car bodies by E. O. Courtemanche of Briggs. Among other things he disclosed the adoption of a new type of light portable projection spot welder used in conjunction with an inert gas such as Argon for making welds in locations where the usual gun welder is ineffective.

The first session of the meeting was devoted entirely to brakes with a discussion of limitations and future requirements of braking systems by T. P. Chase of General Motors Research Laboratories Div. W. D. Rodgers and J. V. Hendrick of Chrysler Corp., outlined the work being done to place the bonding of brake linings to shoes on a mass production basis. They pointed out some of the present problems and the steps being taken for their solution. Discussion of this paper brought out the work being done along this line by General Motors where bonded linings have been adopted for light trucks. The conclusion was that brake lining producers should take the initiative in providing suitable linings sealed to take cement properly, and in looking to the future possibility of supplying linings with a pre-cemented finish. It was agreed that these objectives would require considerable development and service experience. Several papers from this meeting have been abstracted and are presented herewith.

Cylinder Wear and Distortion As Measured with the Cylinder Contour Gage

By Melvin E. Estey
Supervisor, General Research Dept.
Perfect Circle Corp.

THE commonly used dial-type indicator which measures cylinder diameter can be used to determine accurately cylinder size at any selected location within the cylinder. It does not determine whether or not the axis of the cylinder is straight nor does it determine cylinder shape other than difference in diameter.

With the limitations of the dial-type indicator in mind, a cylinder contour gage was designed for research investigation. It is used essentially for determination of cylinder shape rather than size, although the latter may be accomplished. The gage determines cylinder shape by direct measurement of differences in cylinder radius, throughout the cylinder length, from a fixed co-linear axis. This axis is, as near as can be deter-

(Turn to page 58, please)

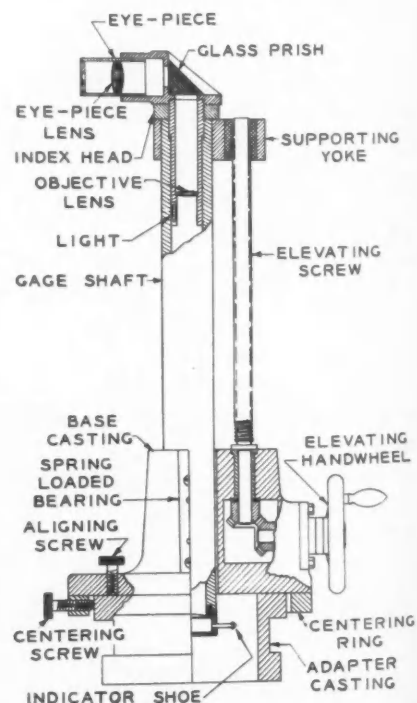


Fig. 1—Sectional drawing of cylinder contour gage.

Production Meeting

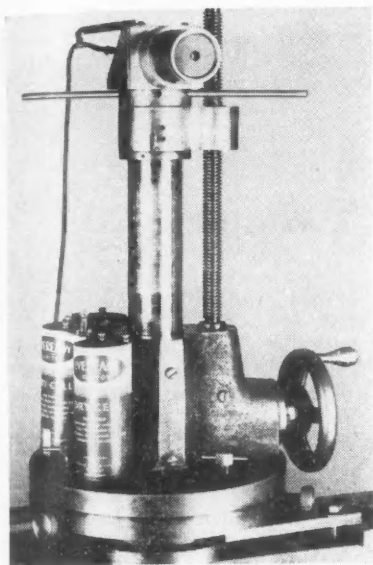


Fig. 2—Cylinder contour gage.

The Buick Dynaflow Drive

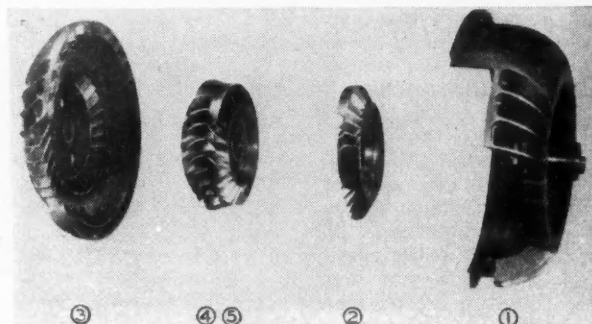
By Charles A. Choyne
Chief Engineer
Buick Motor Division
General Motors Corp.

THE Dynaflow Drive is composed of primarily a polyphase hydraulic torque converter, and secondly, a planetary type gear train. With the latter, two forward driving ranges and a reverse are obtained. No clutch pedal is provided for the disconnection of the engine. Manual selection of driving ranges is made by a lever on the steering column, similar to that used with conventional transmission. Operation of the car requires use of accelerator, brake and steering wheel only, for virtually all normal driving. This simplicity of operation is made possible by the hydraulic torque converter, which transmits the total engine output under all conditions of operation.

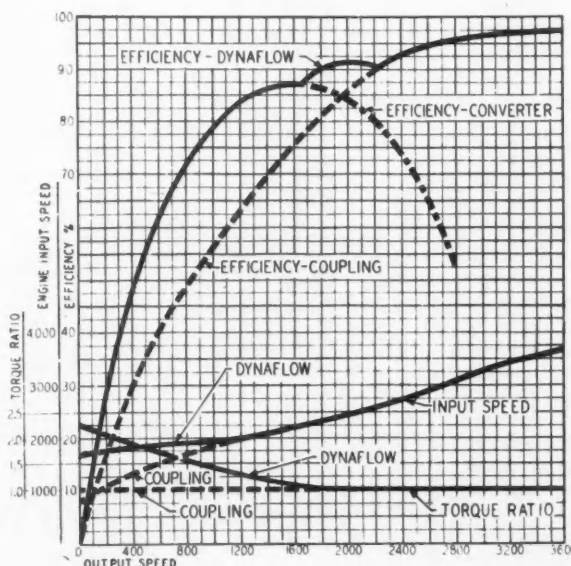
The converter consists of five annular sections as shown in Fig. 3. Each section is provided with inner and outer shells enclosing curved vanes providing impulsion of the contained fluids. These various "wheels" are: (1) the primary pump—driven by the engine; (2) the secondary pump—mounted by means of a free-wheeling clutch upon the primary pump hub—this secondary pump is permitted to rotate about its axis faster than, but never slower than, the primary pump; (3) the turbine, or driven member which is splined to the turbine shaft and drives the car; (4) the first stator; and, (5) the second stator both of which are reaction members. Each stator is

mounted upon a free wheel clutch, permitting motion only in the direction of engine rotation. The hub of these individual free wheel clutches is splined to a reaction shaft which is rigidly attached to the transmission case.

Examination of the performance curves of the Dynaflow converter (Fig. 4) serve to clarify the rather intricate relationships of speed, speed differential, torque multiplication, and relative efficiency. Points of inflection on the efficiency versus output speed curve indicate the multiphase operation of the unit. These "kinks" show when the transition occurs between stator phases. Comparison of this efficiency curve with that of a typical rigid-stator converter demonstrates the marked increase in efficiency of the Dynaflow converter especially at higher speeds. Comparison of this curve with that of a conventional fluid coupling is also of extreme interest in the lower and middle ranges, especially considering the fact that the converter is providing increased output torque which the fluid coupling alone is unable to achieve.



(Right) Fig. 3 — Main elements of the Buick Dynaflow.



(Left) Fig. 4 — Performance curves of the Dynaflow converter.

Stress Engineering As Applied to Automotive Bodies

By Philip O. Johnson and Russell G. Heyl, Jr.
Fisher Body Division
General Motors Corp.

A STUDY of body weight, frame weight, and rigidity of automobiles over the past twelve years indicates that in general the weight has been on the increase while rigidity has been on the decline. A graph showing this trend is shown in Fig. 5.

Normally the efficiency of a structure is based on its strength to weight ratio or its rigidity to weight ratio. If, in an automobile, the rigidity to weight ratio of the structure is taken as a measure of efficiency, it is apparent that the structural efficiency has been getting poorer.

The trend in the past ten or twelve years has been to add weight to the automobile with little or no increase in strength or rigidity. In many cases there has actually been a loss of rigidity. If the present rigidity is sufficient, this rigidity should then be maintained while designing a lighter structure and thus improving the rigidity to weight ratio. Any elimination of weight that does not impair the structure obviously will represent a saving to the manufacturer in fabricating and material cost, and to the owner in operating cost.

In trying to arrive at an efficient structure, the stress engineer uses a basic pattern of approach. A stress

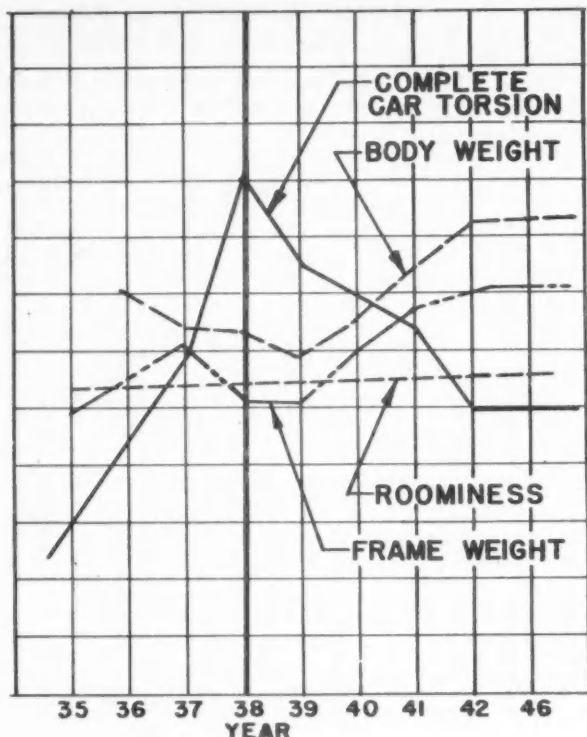


Fig. 5—Trend of car roominess, frame weight, body weight, and torsional stiffness over the past decade.

analysis of any structure may be divided into three major phases as follows:

- (1) Design Conditions—It is first necessary to know just what is required of the structure. What is the maximum external load under all critical conditions. What are the permissible deflections of the various components of the structure.
- (2) Load Distribution—The next step is to trace the external load through the structure and to determine the resulting load in each individual member.
- (3) Detail Analysis—The third step is to determine the resulting stresses in the component parts. (Stress is unit load and is a measure of the strength.) Further, the deflection or strain of the structure is determined.

Development of Low Weight Forgings

By J. H. Friedman
Vice President and General Manager
National Machinery Co.

A RECENT development in the production of low weight forgings on a forging machine or on a Maxipres—the Maxiroll—is a rolling operation which produces blanks with accurately reduced sections to suit the requirements of the final forging. This new method will bring within the low weight, minimum finish category many forgings which are now forged with a large percentage of scrap in the form of excessive flash and with too liberal allowances for machining.

This new Maxiroll technique has already been applied in several dif-

ferent ways to a number of different jobs, and in each case has resulted in forgings having sharper detail with much less flash than has been possible heretofore, and at greatly improved die life. The forging machine die shown in Fig. 6 is an early example of how the new rolling method is used for reducing the end of the stock preparatory to final forging.

The stock, which is previously cut to length, is heated on one end and fed into the top step of the die and against the stock gauge (not shown) of the forging machine. When the dies close, the end of the stock is squeezed down between the segment rolls and, as the heading slide comes on forward, the rollers (A) engage the cam plate (B) which causes the

segment rolls to revolve around the fulcrum pins (C). This causes the blank to move laterally toward the operator in groove (D) to form the blank as shown at (1). The blank (1) is rotated 90 deg and again fed into the same step of the die to form blank (2). The rolling or reducing is completed in one pass in the second step of the die, as shown at (3). Blanks (4) and (5) show the forming and trimming operations respectively, which are handled in the remaining two impressions of the die.

As is shown at (6), the stock is so accurately distributed that the final forging is practically without flash. As a result of the rolling method used in this die, low weight, minimum finish forgings are assured and scrap is kept to a minimum.

Modern Welding Procedures in Building Motor Car Bodies

By E. O. Courtemanche

ONE of the newest methods to come into use in welding passenger car bodies is poke spotwelding. This method employs a light-weight gun, a fixed electrode, a device for cooling the electrode and a means for surrounding the weld area with argon gas. To make the weld, the operator pushes the gun against the surface to be welded, opens a valve which starts the gas flowing, and closes a switch in the handle of the gun. This causes a high frequency current to flow from the electrode to the work. (See Fig. 7)

The high frequency current is used to start the flow of the high welding current. After a pre-set time interval, which can be varied to suit the material being welded, both currents are shut off and the weld is complete. This method was developed primarily to weld in places where portable welders could not be used. For example, it is used for boxed in sections which occur at

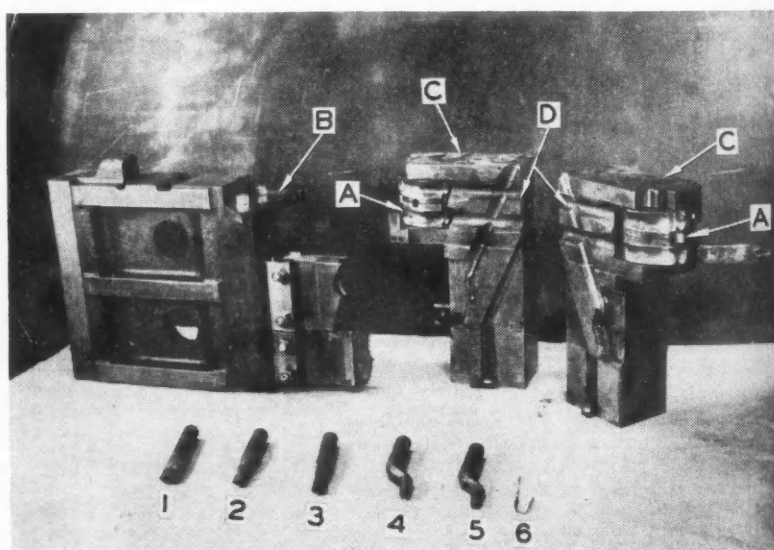


Fig. 6—Forging machine die.

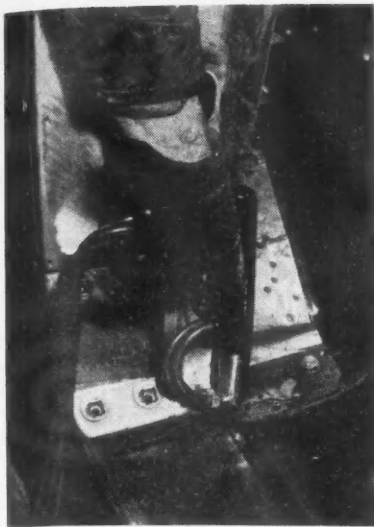


Fig. 7—A welder at Briggs Manufacturing Co. uses a lightweight gun for poke spot welding the front body pillar reinforcement to the floor pan. The spot weld to the right of the gun has been completed.

pillar reinforcements to the floor pan, seat risers to the floor pan and similar location. Undoubtedly, as poke spotwelding is improved, there will be many more applications where it can be used to advantage.

Aluminum for Body Stampings Selection of Alloys, Drawing and Joining

By J. H. Dunn, E. G. Kort and G. O. Hoglund
Aluminum Company of America

THE current shortage of light gauge steel sheets has focused a great deal of attention on the possibilities of substituting aluminum alloy in passenger car bodies. When substituted gauge for gauge, one pound of aluminum will release almost three pounds of steel and even the higher cost of aluminum may be justified where production can be

substantially increased with little or no increase in overhead. Experiments have shown a complete coach door in steel to weigh 101 lb, but only 66 lb in aluminum. A steel deck lid requiring 25 lb of effort to lift, required only 16 lb when made of aluminum. In such and similar cases, aluminum may have a future in the automotive field.

Single item purchases in the automotive business are frequently much larger than those normally encountered in other industries. Looking forward to such conditions, the Aluminum Company of America selected two alloys which seemed best suited to automotive requirements, and which could be suitably priced when produced in the large quantities contemplated. These were designated Alcoa No. 2 automotive sheet and Alcoa No. 3 automotive sheet. Alcoa No. 2 automotive sheet furnishes a good combination of properties from the standpoint of strength, resistance to corrosion, workability and price

for automotive applications. It is of the magnesium-manganese type, and has the typical properties shown in Table I. Alcoa No. 3 automotive sheet is superior to No. 2 in workability, but its strength is somewhat lower. It has excellent resistance to corrosion. Typical properties are shown in Table II.

These two alloys have been used extensively for automotive body stampings. Alloy 52S has also been used. Its mechanical properties are a little higher than those shown in Table I, and in some cases it exhibits better drawing characteristics.

As will be seen from Tables I and II these three alloys are available in the annealed, intermediate and hard worked tempers obtained by cold working. Of course, it is desirable to select an alloy and temper that will permit the fabrication of the particular part satisfactorily, with as high resulting properties as possible. Deep drawing work generally dictates that

(Turn to page 70, please)

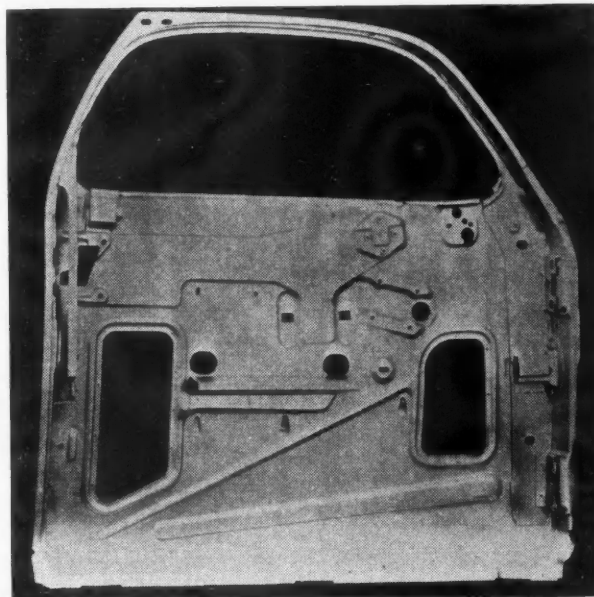


Fig. 8. — Automobile door drawn from Alcoa 61S-O aluminum alloy.

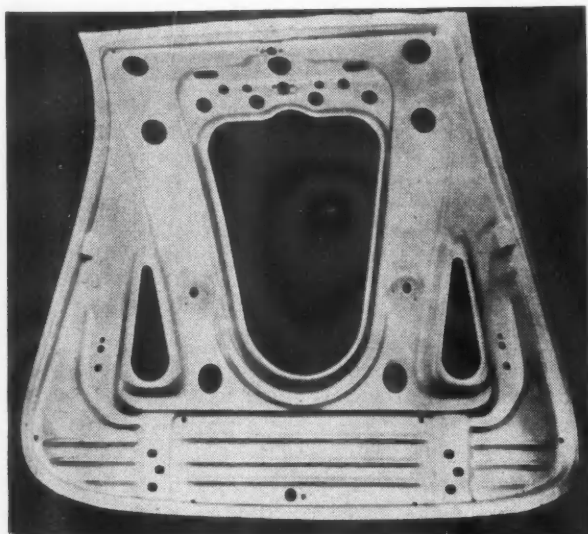


Fig. 9 — Automobile rear deck liner drawn from Alcoa 61S-O aluminum alloy.

TABLE I
ALCOA NO. 2 AUTOMOTIVE SHEET
TYPICAL PROPERTIES

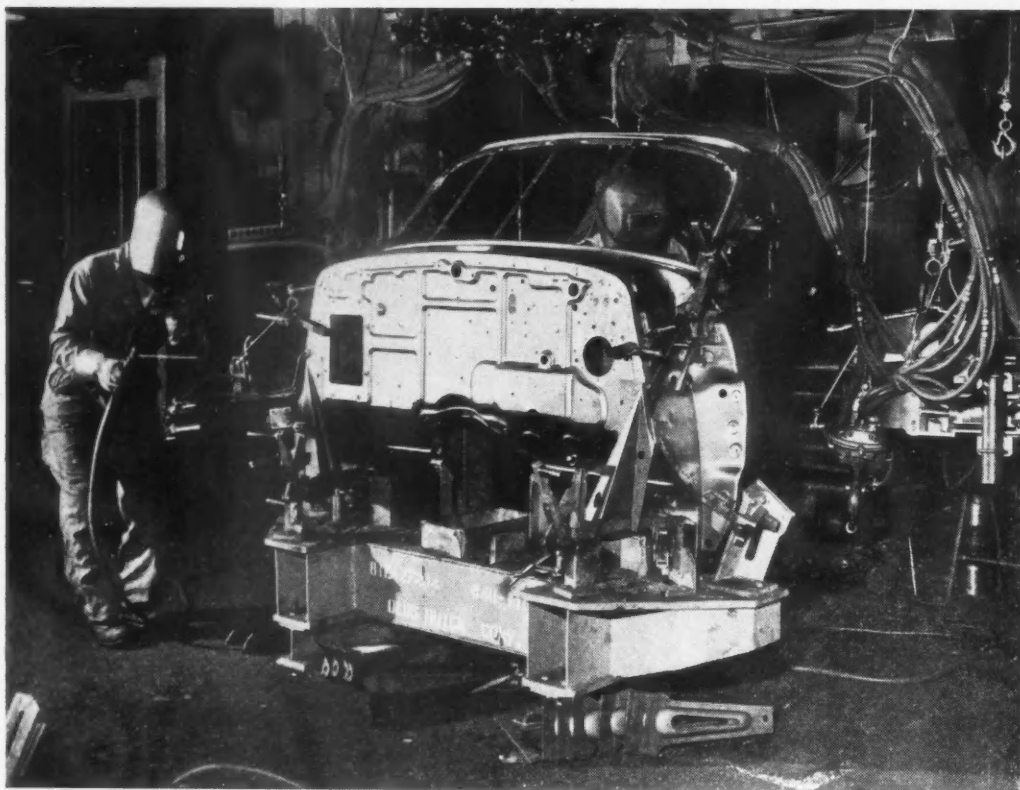
Temper	Tensile Strength (psi)	Yield Strength (psi)	Elongation (% in 2 in.)	Endurance Limit (psi)
O	26,000	10,000	20	14,000
H32 (1/4H)*	31,000	22,000	10	14,500
H34 (1/2H)*	34,000	27,000	9	15,000
H36 (3/4H)*	37,000	31,000	5	15,500
H38 (H)*	40,000	34,000	5	16,000

* Former temper designation given in parenthesis for information.

TABLE II
ALCOA NO. 3 AUTOMOTIVE SHEET
TYPICAL PROPERTIES

Temper	Tensile Strength (psi)	Yield Strength (psi)	Elongation (% in 2 in.)	Endurance Limit (psi)
O	16,000	6,000	30	7,000
H12 (1/4H)*	19,000	17,000	10	8,000
H14 (1/2H)*	21,500	19,000	12	9,000
H16 (3/4H)*	25,000	22,000	5	9,500
H18 (H)*	29,000	26,000	4	10,000

* Former temper designation given in parenthesis for information.



A number of welding fixtures are employed in the integration of the front end sub-assembly. This is the last of the group completing the details and making the assembly ready for the body-in-white line

Futuramic Bodies Require Major Change-Over

WITH the adoption of the Futuramic body on the 1948 Series 98 Oldsmobile, the Lansing Fisher Body Division plant recently experienced its first major changeover in body building since before the war. Changes were introduced in the form and size of fixtures, and refinements were added to the fixtures to improve their utilization.

Major sub-assemblies such as the dash and shroud, complete front end and balloon are prepared as formerly in massive welding fixtures. The complete body assembly is then integrated in successive stages on the assembly conveyor. In accordance with standard practice at Fisher, the final assembly is built up on individual body trucks. These trucks for the Futuramic body represent an improvement over those formerly used. The underbody is installed and securely fastened to the fixture. To this is added the shroud section, then the balloon assembly.

For final framing on the assembly line, Fisher gate fixtures are used to develop door openings in proper alignment. At appropriate points along the line, similar fixtures are used for the windshield opening, rear window and gutter at the trunk opening. By this

means it is possible to integrate the entire structure on a moving conveyor line without resorting to the massive fixed framing jigs used in earlier practice.

Also of interest is the fact that the reference line controlling body dimensions has been changed with the introduction of the new body and the new wide hood. To facilitate hood installation on the final car assembly line, the reference line now is along the hood line on the upper shroud panel and around the front hinge pillar profile.

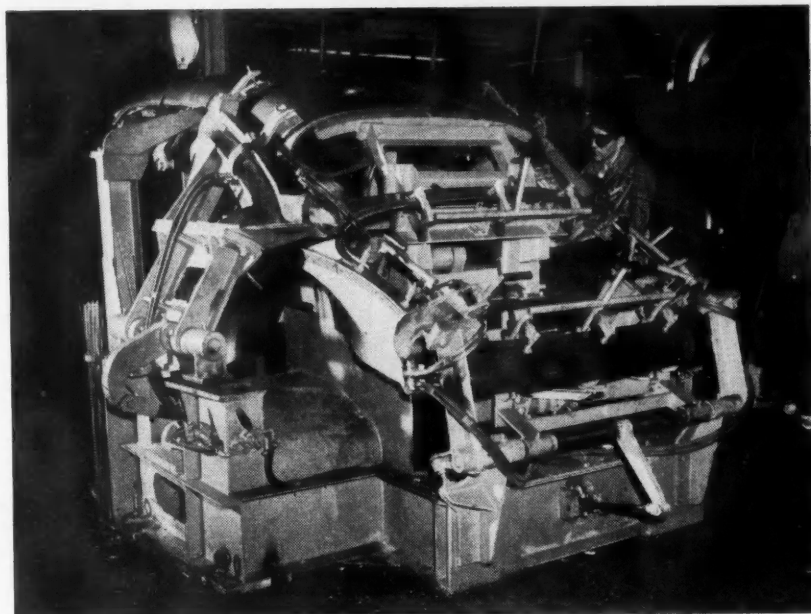
The Lansing Fisher Body Division also is building smaller bodies for other lines as well as convertibles. To facilitate the use of the variety of similar fixtures employed, all fixtures are painted in a characteristic color for each body type. Thus the fixtures for the Futuramic body are finished in an orange for easy identification.

Body trucks for these bodies have been improved in design and detail to assure a proper backbone for the body structure from start to finish. Once an underbody has been securely attached to the truck, the body stays on the truck until it is ready for body drop. Interesting detail of quality control is that, as

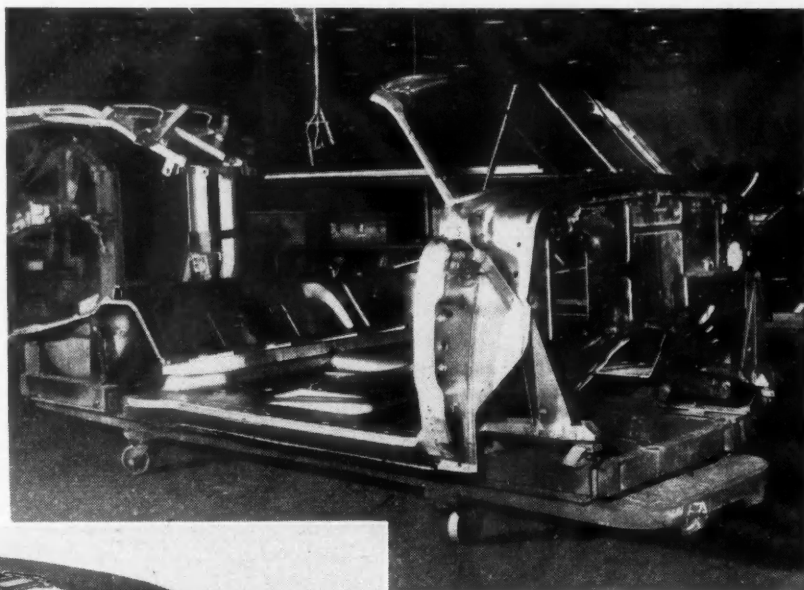
the trucks return to the start of the welding line, they are inspected individually by means of a massive inspection fixture to assure the correct alignment of the truck and its major fastening points. If any mis-alignment has occurred during the trip through the body plant and to the motor division it is corrected before the truck goes back to the line.

The Futuramic body is distinguished by many unique design details. To achieve the particular structural design, many of the parts and sub-assemblies have been broken down into more individual sections than in previous practice. The shroud, for example, is fabricated by welding together the shroud upper, shroud sides and dash panel. Instead of a one-piece windshield frame stamping, the frame is now composed of a separate upper panel and individual side frame sections, the latter constituting a stiff diagonal brace for the cowl sides and front hinge pillar. Similarly, the short box-section front hinge pillars — which have the same profile as the outer door panel—are fabricated as individual members and later welded to the side of the shroud.

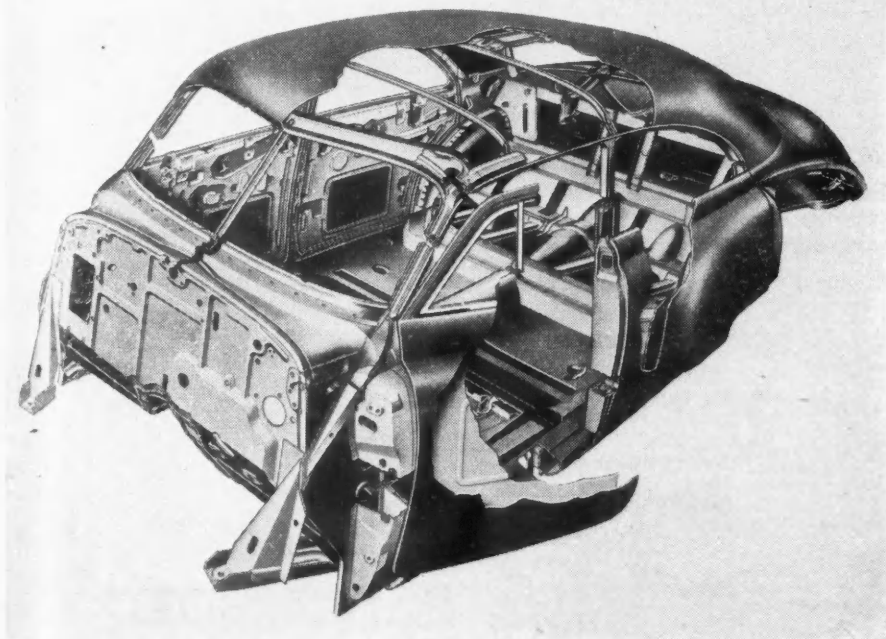
The method of installing windshield and rear window glass has been changed completely. Instead of fixed frames, Fisher now em-



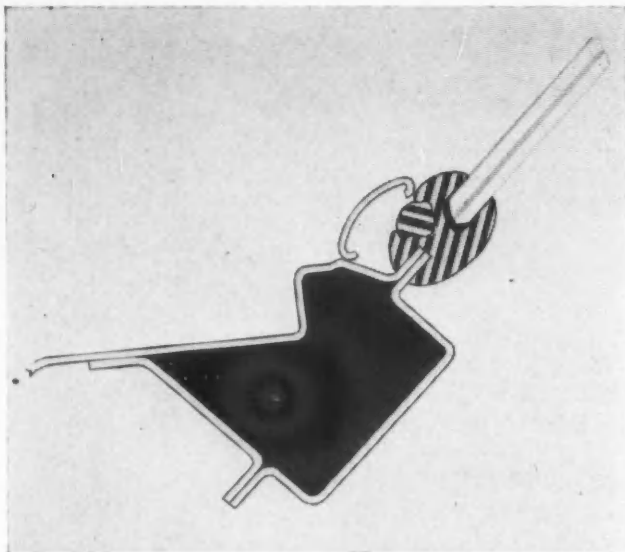
Typical of the massive framing jigs used in the plant is this new welding fixture for preparing the balloon assembly for the new body



The body-in-white line starts with the special body truck to which has been fastened the underbody and the front end sub-assembly. The truck starts on the conveyor line for its lengthy trip over the body-in-white and paint lines

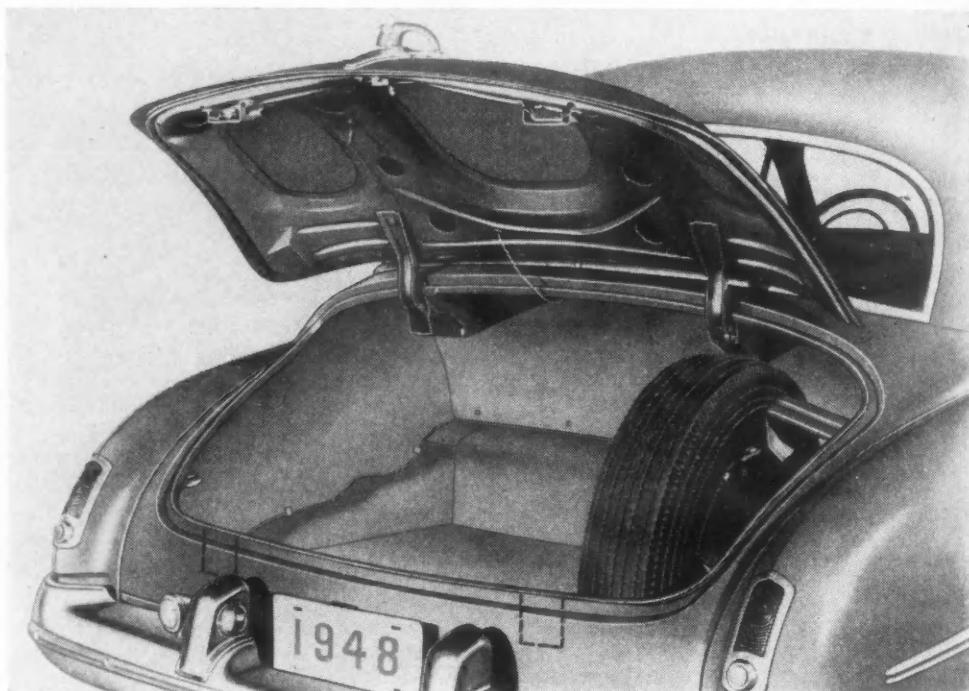


Cutaway drawing of new Olds Futuramic body showing some of the principal features of construction



Cross-section through lower edge of windshield to illustrate the new method of mounting windshield and rear window glass sections. The thick rubber section is the continuous rubber molding into which the glass is inserted. The glass then is securely locked in place by means of the "zipper"—the small cross-section rubber molding—which is forced into the glass molding

(Right) Rear deck with lid open to show new trunk lid hinge construction. This photo also gives a good view of the drain gutter around the deck opening, the weatherseal being attached to the edge of the lid



plays a continuous soft rubber molding of unique cross-section with a cored groove around the entire outer periphery. This molding is installed in the window opening by application to the pinch weld flanges. It is well lubricated to permit easy installation of glass sections. Then a "zipper," consisting of a molded strip of triangular section, is inserted into the cored opening in the glass molding to lock the glass firmly.

Finally, the outer frame is finished off with reveal moldings while the inner frame is fitted with garnish moldings. However, there is no pressure on the glass from the framing, making it truly rubber-cushioned.

Mounting of the trunk lid also has been simplified and improved. The new mounting consists of two hinges of special design incorporating torsion type coil springs to hold the lid in open position. The effort required to lift the lid is so slight as to permit women to open the trunk compartment without difficulty. Another feature of the trunk compartment is the development of a deep and well formed gutter whose function is to catch water and permit it to run off. The weather seal is attached to the trunk lid rather than in the gutter.

The following British Diesel engines produced by the Associated British Oil Engines. Ltd. arrived too late for the 1948 Statistical Issue of **AUTOMOTIVE INDUSTRIES**.

	MIRRELES		McLAREN	
	TVE	TVTE	MR 2*	
Type	Direct Inject	Direct Inject	Turbulence	2
Number of Cylinders	12	12	5.59" x 7.874"	49 cu in
Bore and Stroke	8½" x 13¾"	8½" x 13¾"		44 @ 1000
Displacement	9360 cu in	9360 cu in		48.4 @ 1000
Max. bhp @ rpm	720 @ 750	1050 @ 750		39.6 @ 1000
Max. Intermit. hp @ rpm	792 @ 750	1155 @ 750		16.5
Sustained hp @ rpm	648 @ 750	945 @ 750		750
Compression Ratio 7 to 1	13.5	13		273 @ 800
Combustion pressure, psi	780	750		3
Max. Torque @ rpm	5250 @ 550	7650 @ 575		
Number of Main Bearings	7	7		

*—Also available in 3, 4, 5, and 6 cylinders.

Two European Transmissions with Automatic Clutches

By W. F. Bradley,

Special European Correspondent for Automotive Industries

TWO new transmissions have been announced recently in Europe, both of which utilize epicyclic gear trains with automatic clutches. One, produced by Hobbs Transmission, Ltd., England, has seven forward speeds and two reverses, and has been tested on a $3\frac{1}{2}$ -ton truck. The other, the French Chatelet-Michellet electro-magnetic transmission, is intended as a replacement for the three-speed mechanical transmission used on front-wheel drive Citroens. It is recommended for use with the Gravina automatic clutch, although the transmission will operate with the standard-type friction plate clutch.

Main features of the Hobbs transmission are epicyclic gear trains controlled by automatically-operated friction clutches and brake plates. The device provides a wide range of ratios with automatic clutch control. A very smooth take up of the drive is assured, for clutch engagement is entirely automatic,

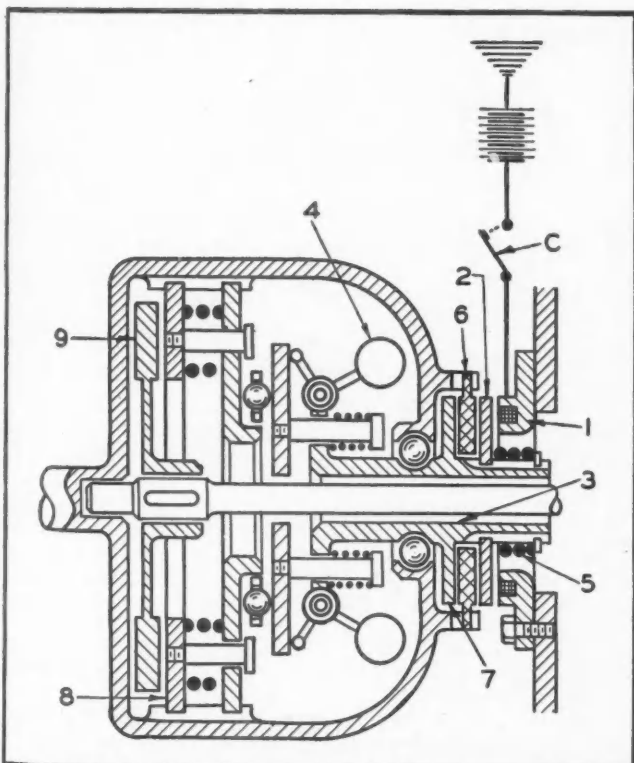


Fig. 2—Chatelet-Michellet electro-magnetic transmission.

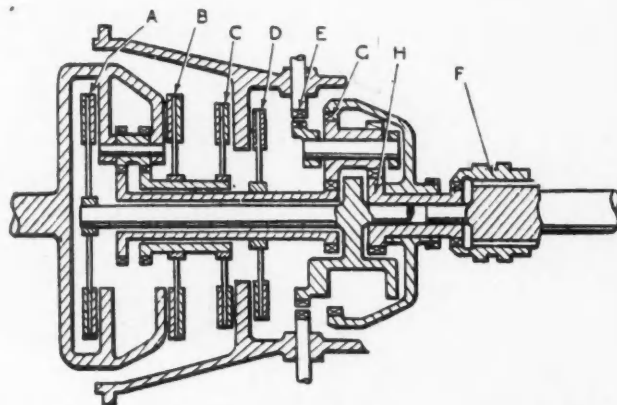


Fig. 1—Diagrammatic drawing of Hobbs seven-speed transmission. KEY:—A, B, C and D, Clutches. E, Pawl. F, Dog Clutch. G, Ring Gear. H, Sun Gear. Parts engaged for following gears:—Reverse:—C (or B), E; F with G. Neutral:—E; with H. First:—E; F with H; C. Second:—B, E; F with H. Third:—A, D; F with H. Fourth:—A, C; F with H. Fifth (direct):—A, B; F with H. Sixth (overdrive):—A, C; F with G. Seventh (overdrive):—A, D; F with G.

there being no clutch pedal. Operation by the driver consists in moving the gear lever from neutral to first gear position, and then pressing the accelerator pedal.

Fig. 1 shows two clutches, A and B, and two brake plates C and D. Between clutches A and B are two sun wheels engaging (Turn to page 64, please)

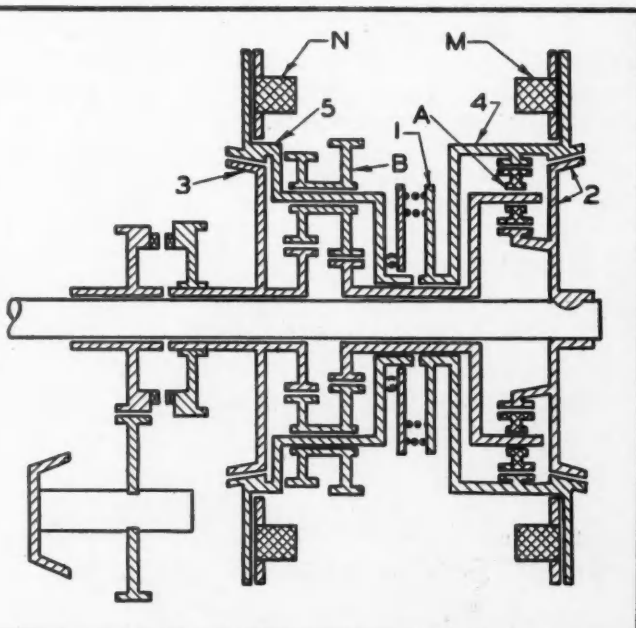
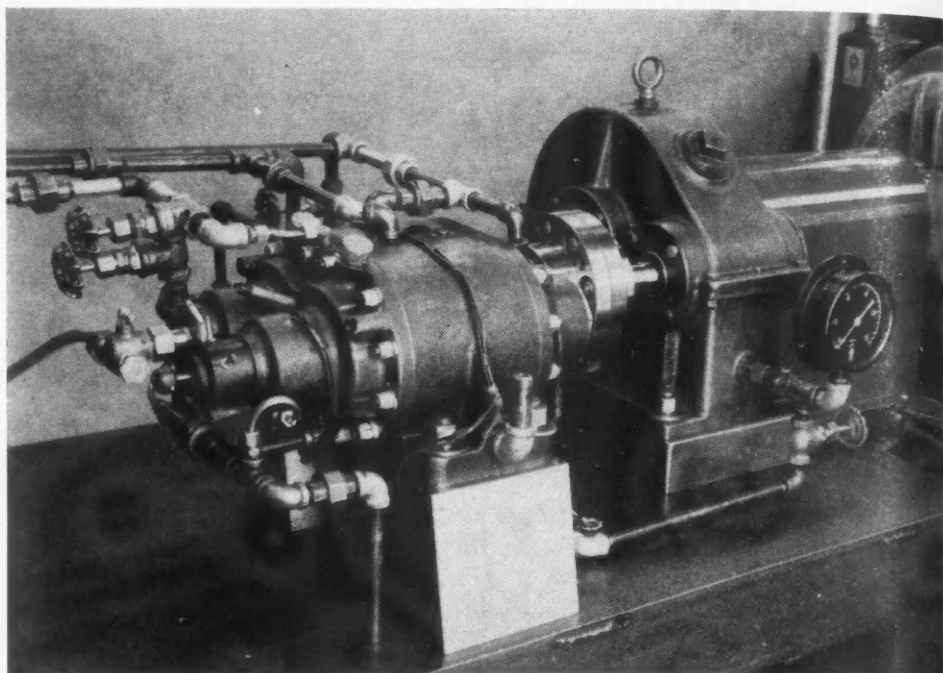


Fig. 3—Gravina automatic clutch.

Fig. 1—Pratt and Whitney gear tester assembled with a step-up gear box for speeds up to 10,500 rpm.



Small, Simple Machine Tests Gears and Lubricants

A SMALL, simple machine has been developed by Pratt and Whitney Aircraft Div., United Aircraft Corp., for bench testing gear materials and gear lubricants. Intended for aircraft engine research, the new gear and lubricant tester uses as test specimens a pair of gears which are like those used in an engine, but as simple in design as possible to reduce manufacturing costs. One of the gear testers is now in use at Pratt and Whitney for testing high-speed gears for propeller turbines at speeds of approximately 10,000 rpm. Several additional machines are being installed in the P & W laboratory for research on surface effects.

The gear and lubricant tester, shown in Figs. 1 and 2, has
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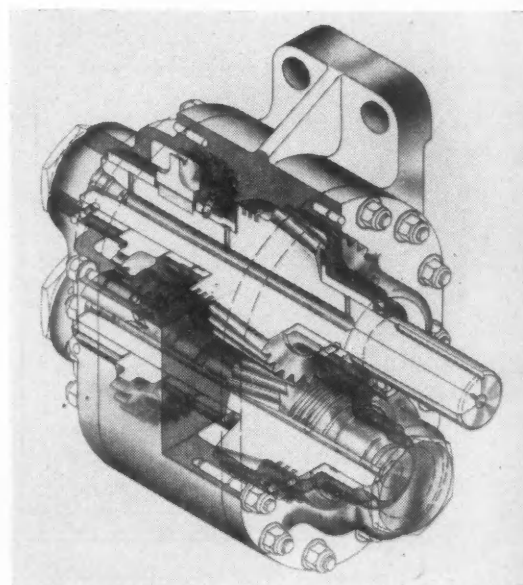
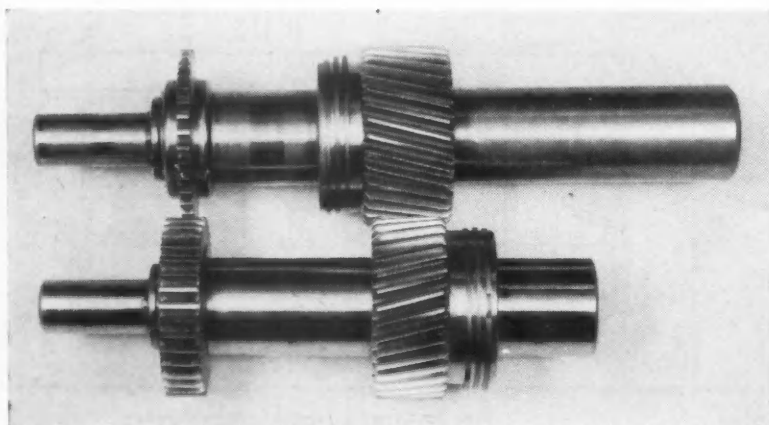
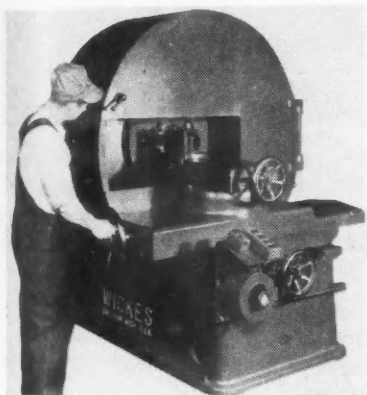


Fig. 2—(Above) Phantom drawing of the gear and lubricant tester

Fig. 3—(Left) The helical gears and shafts, shown in this photo, are integral. The narrow-faced gear at the upper left is the test gear. Load is applied to the coupling by means of hydraulic pressure against the large gear hubs.

J-81 — Grinding Wheel Salvaging Machine

A grinding wheel salvaging machine has recently been developed by Wickes Brothers, Saginaw, Mich. This machine is capable of handling grinding wheels up to 42 in. in diameter and 14 in. thickness. Wheels that have served their useful life on one type of grinding machine can be re-worked for subsequent use on another grinding operation. The outside diameter can be reduced, the sides can be turned down or the bore



Machine for salvaging grinding wheels made by Wickes Bros.

enlarged. The machine is also suitable for doing angular work on grinding wheels. It is powered by a five-hp, d-c main drive motor for operation of the main spindle over a wide speed range. The weight, including electrical equipment, is 10,000 lb.

J-82 — Two New Eastman Developments

A new device for gear inspection, based on the use of a gaging element produced as a single-threaded worm, was recently originated by the Eastman Kodak Co., Rochester 4, N. Y.

Such a gaging element, called a master worm section, can be used to check either spur or helical gears of the right or left hand regardless of helix angle. Since a master worm section is conjugate to any gear of like normal pitch and pressure angle, the name Conju-gage has been given to the gear checking instruments using this type of gage.

Incorporated in a testing instrument of the variable center-distance type, the master worm section provides a means of checking composite error in gears. Several such instruments, using the worm section, have been developed by Eastman Kodak. These are designed to handle gears ranging in size from the smallest watch pinions to pitch diameters of as much as 8.25 in. The gear is meshed with the rack-like worm section, which is traversed along its axis,

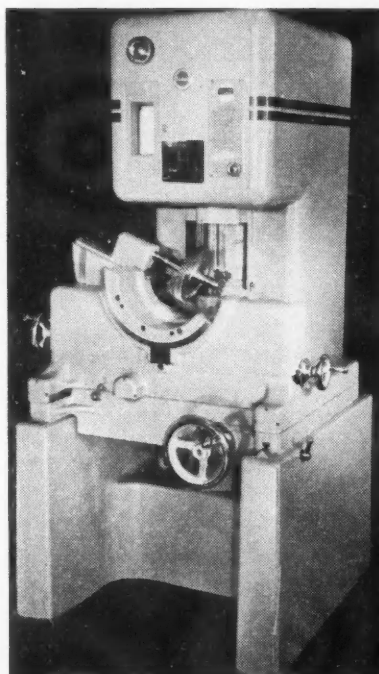


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and the variations in center distance measured either directly on a gage or by an automatic charting device. In the latter case, separate errors which make up composite error—such as profile error, tooth-thickness error, tooth-spacing error, eccentricity, and runout—can be evaluated from the chart.

The master worm section is ground as a section of a worm, on a thread grinder, and can be held to extremely close tolerances. As a result, it absorbs little or the total tolerance allowed in inspection operations.

Another Eastman development is



Eastman Conju-gage

a new contour projector. According to the manufacturer the instrument features: Adequate staging space between the part and the first lens, even at the highest magnifications; freedom from distortion at all points on the viewing screen; uniform, brilliant illumination, permitting the use of the instrument in fully lighted rooms without hoods or curtains; and

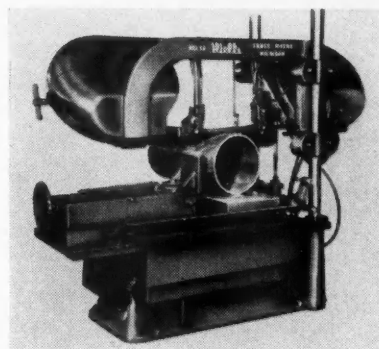
ease of operation by eliminating the need to refocus or make other adjustments when magnification is changed.

In addition to the improvements incorporated in the contour projector itself, a number of accessories have been designed for use with it by Kodak engineers.

J-83 — Band Saw With Wet Cutting System

The new Wells No. 12 heavy duty metal cutting band saw, with automatic cutting cycle and electrically controlled blade pressure, made by the Wells Manufacturing Corp., Three Rivers, Mich., is now available with a complete, self-contained Wells wet cutting system.

The system which is installed as an integral part of the saw includes



Wells No. 12 Band Saw

a chip pan, fluid tank, centrifugal type pump-motor unit, splash guards and protective screens. The chip pan is mounted between bed and base. All working parts are readily accessible and a convenient valve permits adjustment of flow. Working capacity of the system is three gallons of fluid.

J-84 — New Motor Control Center

A new motor control center which makes possible controlling any number of motors rated up to 200 hp at 440 volts from one central location, is a recent development of the Control Divisions of the General Electric Corp., Schenectady, N. Y. These control centers are designed so that all connections can be made from the front, thus permitting the centers to be lined up against the wall or in back-to-back fashion to conserve space.

These new control centers consist of standard starter units which are slid into vertical, cabinet-type sections in "building block" fashion. The sections are 90 in. high, 20 in. wide, and 12 in. deep. The starters are furnished in five different sizes. Each

starter is a complete, fully-enclosed unit which can be arranged within the vertical sections to suit the requirements of the user.

Power connections to the starters are made by "clothes-pin" contacts which grasp vertical busses in the rear of the sections when the starters are slid into place. Control interconnections to other motors and control are made through a special wiring trough, with a removable cover, which runs the length of the sec-



G-E motor control center

tion. All wiring can be done from the front without disturbing the starters.

Each starter has a built-in circuit breaker for short-circuit protection. These breakers are interlocked so that the doors of the sections cannot be opened when the power is on.

J-85—Hidden Arc Welding Machine

The advantages of welding with the hidden arc, deep flux process employing high current densities have been extended by a recent development in this field by the Lincoln Electric Co., Cleveland, Ohio. The development, known as the Manual Lincolnweld, increases the versatility of the hidden arc process by providing maneuverable welding equipment that produces the smooth, deeply penetrating, spatter-free welds normally associated only with fully automatic operation, according to the manufacturer.

The Manual Lincolnweld equipment is a self-sufficient, portable unit for semi-automatic welding, providing the welding current and auxiliary power plus the automatic wire feed mechanism and controls. The basic element of the unit is a standard 600-amp welder which can be used for straight manual welding as well as semi-automatic welding. Mounted on the welder is a unit containing the wire reel, feed mechanism, drive

NEW

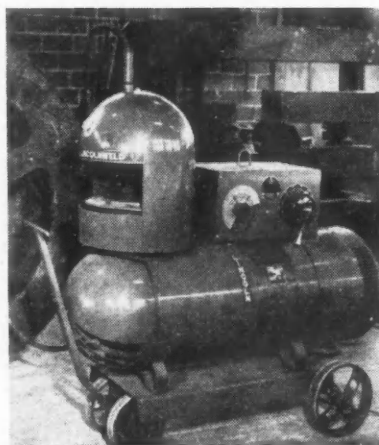
Production and Plant

EQUIPMENT

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motor and voltage controls. A special cable to which is attached a cone-shaped welding gun completes the equipment.

The aluminum cone shaped welding gun holds 3½ lb of flux which is dispensed by gravity through a special head-treated nozzle in sufficient amount to cover the arc as the weld is made. The nozzle, which is insulated from the rest of the gun, also



Manual Lincolnweld equipment for semi-automatic hidden arc welding

introduces the welding current to the wire and straightens the wire as it is fed through.

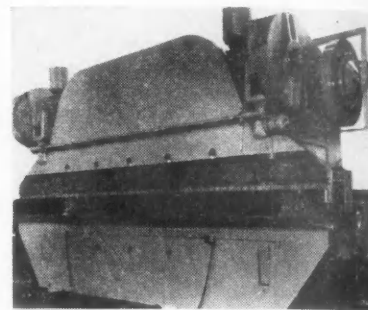
The gun is attached by a detachable coupling to a cable that runs to the feed mechanism unit. The cable provides a flexible carrier for both the wire and the current. The equipment will operate with a maximum of 25 ft of cable.

J-86—Two-Housing Mechanical Press Brake

A two-housing, mechanical press brake, recently designed and built by the Cincinnati Shaper Co., Cincinnati, Ohio, has a clear span between housings of 21½ ft, and an overall die surface of 30 ft. The gap or throat in the housings is 24 in.

The steel plates from which the main machine members were fabricated are said to have included the largest rolled steel plate produced in

the world. Housing plates were 10 ft 4 in. wide by 15½ ft long by 8 in. thick, and weighed 53,000 lb each. The ram plate was 7 in. thick by 112 in. wide by 30 ft long, and weighed 78,500 lb. Bed plate was 7 in. thick by 108 in. wide by 30 ft long and weighed 71,500 lb. The gross weight



Two-housing, mechanical press brake built by the Cincinnati Shaper Co.

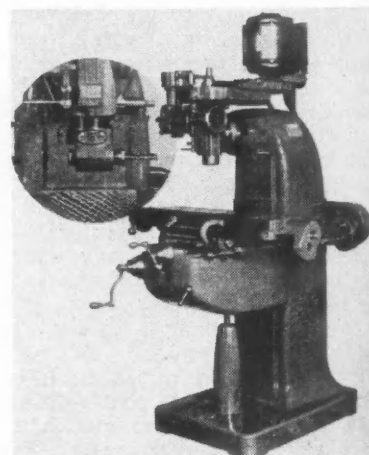
of the completed machine is approximately 300,000 lb.

This machine is capable of bending 30 ft of ¼ in. plate over an 8 in. die opening and heavier plate of shorter lengths. It can be used for multiple or gang punching as well as for bending.

J-87—High-Speed Milling Machine

The Index Machine Co., Jackson, Mich., has brought out a new Model 50 high speed vertical milling machine. This machine is said to be of exceptionally rigid construction. A quick change, full-geared table feed mechanism delivers power to the table through a splined feed shaft, eliminating the key-way of the lead screw.

The Index Model 50 has a wide range of working capacity, being



Index milling machine

used for vertical and horizontal milling as well as boring and drilling. Table size is 8 in. by 34 in. with three table speeds that can be indefinitely varied and twelve cutter speeds up to 2400 rpm. Spindle downfeed and table feed are automatic.

K-80 — Stainless Steel Electrodes

Twenty-seven new Flexarc stainless steel electrodes covering the complete range of types and diameters— $\frac{1}{16}$, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ in.—required for all commercial grades of chromium, nickel and straight chromium steels are available from Westinghouse Electric Corp., Pittsburgh 30, Pa.

These electrodes are produced in two popular types; a combination titania-lime type coating suitable for welding with a-c and d-c reverse polarity, and a straight lime-type coating for welding with d-c reverse polarity only.

Each of these types is suitable for welding in all positions in diameters $\frac{1}{8}$ in. and below, and each meets the requirements of the new AWS designation A 5.4-46T, ASTM, designation A 298-46T tentative specifications for chromium and chromium-nickel steel welding electrodes where applicable.

Characteristics of these stainless steel electrodes are said to be the fine smooth bead finish with relatively flat contour, smooth action with extremely low spatter loss, and excellent slag characteristics resulting in correct bead formation and easy cleaning.

K-81 — New Twin 4 Diesel Engine

The Detroit Diesel Engine Division of General Motors Corp. has added a Twin 4 Diesel engine to its line of industrial power plants. The new multiple engine unit, Model 8-103, consists of two GM Series 71 4-cylinder Diesels mounted side by side on a common base and geared to a single output shaft. The 170 continuous bhp developed by this multiple unit fills a gap between single 6-cylinder and Twin 6 models in the GM Series 71 line. In the interest of parts standardization and simplified maintenance,



For additional information regarding any of these items, please use coupon on page 56.

nance, the Twin 4 is patterned closely to the Twin 6. Many components such as transfer gear cases, clutch and throttle controls follow the same design and are interchangeable between the two models.

Purchasers have a selection of four different power take-off arrangements to choose from so that the unit can be adapted to a wide variety of industrial assignments. The following types are available as standard or optional equipment: The H.D. or heavy duty power take-off which has been designed to take pulley or chain drive side thrust without the need of special cradle-mounted sheave or sprocket; The S.S. or stub shaft that can accommodate any of the various types of couplings encountered with heavy duty industrial machinery; the O.H. or S.A.E. "O" size housing which will support any close coupled power take off within the proper horsepower range; the D.F. or drive flange which is available for installations where the driven machinery is to be coupled directly to the power unit.

Transfer gear cases may be obtained with gear ratios of 1 to 1, 1.33 to 1, 1.76 to 1 or 2 to 1.

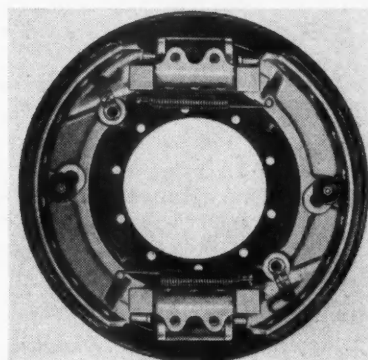
Twin 4 units are offered with either right or left hand rotation and may be equipped with electric, air

or gasoline starting devices depending upon individual customer preference.

K-82 — Self - Centering Hydraulic Brake

The Automotive Division of Wagner Electric Corp., of St. Louis, Mo., has brought out a new Hi-Tork self-centering (Wagner Type FR) hydraulic brake, with two forward-acting shoes, designed for use on medium and heavy duty vehicles. Double-end wheel cylinders are located at both ends of the brake shoes, hydraulic power is distributed equally and directly to both shoes, and both brake shoes are fully energized in forward and reverse direction of wheel rotation.

Adjustment of the FR brake has

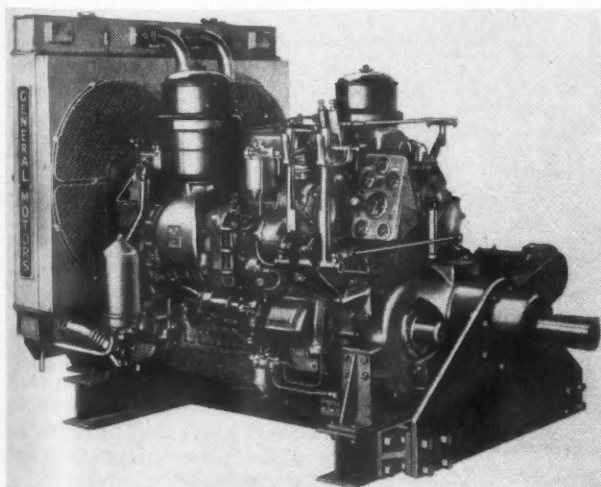


Wagner Type FR brake assembly

been simplified. An adjustment in two places on each brake is performed by inserting an Allen wrench into a slot in the backing plate and turning in the same direction as wheel rotation during forward motion. No locking of the adjustment is required after this operation. Shoe-centralizing adjustment is never required, as the brake shoes are automatically centered by moving radially along the sides of anchor blocks until they are in proper position in relation to the drum. This results in centering the shoes during each brake application. In the event of brake drum distortion, brake shoes adjust themselves to conform to the drum. Front and rear brake shoes and lining, as well as upper and lower wheel cylinders, are identical.

K-83 — Push - In Type Snap Fasteners

Fastening devices of a new type that require no thread or special receptacles for secure holding, are now in production at Shakeproof, Inc., Chicago, Ill. Generally designated as push-in type snap fasteners, they are stamped from spring steel and

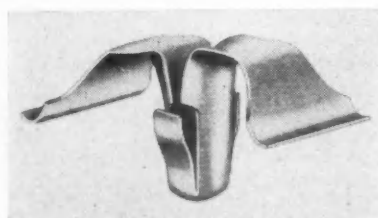


Model 8-103 Twin 4 Diesel engine

form a resilient, vibration-resistant lock to hold sheets, panels, brackets, etc., in place.

Chief advantages of these new snap fasteners are reduced assembly time and material cost savings. In operation, a quick push with the thumb seats the fastener and no further rotation or setting operation is necessary. On many applications, because the fasteners eliminate the need for nuts, washers, spacers, etc., one snap fastener replaces four or even more separate pieces.

The operating principles of the snap fasteners is simple. In forming, extended spring prongs are



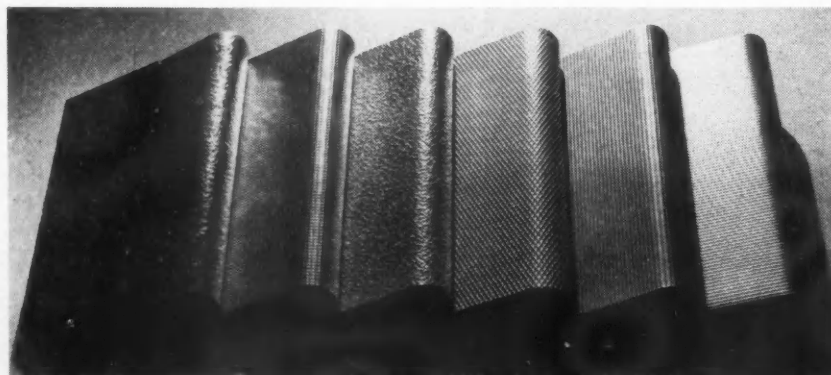
One form of Shakeproof push-in snap fastener. Others are available

stamped as an integral part of the fastener. These prongs compress as the fastener is pushed into a punched or drilled hole and spring out again on the far side of the joint to hold the assembly together under constant spring tension.

Adaptable to a wide variety of special needs, the new snap fasteners can accommodate total material thickness variations of more than one sixteenth of an inch without loss of efficiency, according to the manufacturer.

K-84 — Embossed Aluminum Sheets

The Reynolds Metals Co., Louisville 1, Ky., is now producing an entirely new and different type of embossed aluminum sheets. The Company's aluminum sheet mills are set up with matched roller-die embossing machines to emboss decorative pat-



Embossed aluminum sheet patterns made by Reynolds Metals Co.



For additional information regarding any of these items, please use coupon on page 56.

terns in aluminum sheet and they can supply such patterns as squares, diamonds, stucco, and simulated grained leather, as well as ribs crosswise and ribs lengthwise. This new development is adaptable to a wide variety of applications, such as truck bodies, etc.

The new product can be supplied in flat sheet in thicknesses ranging from a minimum of .010-in. to a maximum of .040-in. and in widths from a minimum of 12 in. to a maximum of 48 in. Coiled sheet can be furnished in thicknesses between .010-in. and .040-in. and in widths ranging from 6 in. to 36 in.

K-85—Permanent Magnet Material

General Electric's Metallurgy Division has worked out a method of sintering Alnico 5, a permanent magnet material which permits the design of intricate shapes with higher external energy than has been heretofore possible. The material is said to be especially adaptable where small powerful magnets having high magnetic properties are required.

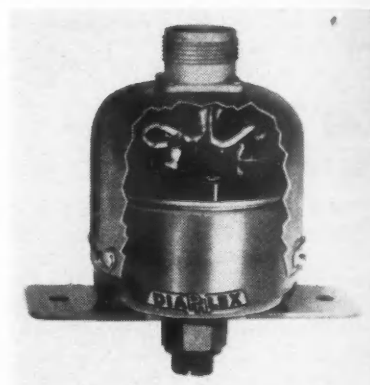
G.E. states that the sintering process permits the economical production of small sized parts which are finer grained, less brittle. The material has unusually high tensile prop-

erties and can be produced with smooth surfaces and close dimensional tolerances. The fine structure of the G-E material also is said to eliminate crystal pick-outs and pitting.

Sintered Alnico 5 has a residual induction of 10,000 gauss and a coercive force of 575 oersteds. Its available minimum energy is 3,500,000 gauss-oersteds for most sizes and shapes. These properties apply only in the direction of heat treatment.

K-86 — High Pressure Control Switch

Diaphlex Division of Cook Electric Co., Chicago 14, Ill., announces quantity production of the new Hydrotol high pressure switch. Design features are said to give this switch true linear adjustment over an operating range from 50 to 5000 psi. The on-off differential is adjustable and ranges from 5 to 50 per cent. This high pressure range and accuracy are made possible by use of a welded SAE 4130 steel diaphragm hydraulically formed and heat treated. This



Diaphlex Hydrotol valve

diaphragm can be constructed to withstand a bursting pressure in excess of 15,000 psi.

Originally designed for aircraft use, Hydrotol's construction makes possible a design of 9½ cu. in. of displacement and a weight of only 17 oz. Current rating is 10 amp at 110 volts a-c, or two amp at 28 volts d-c.

K-87—Improved Grease-Testing Machine

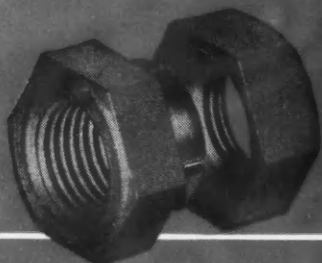
An improved machine which permits engineers to determine how well various kinds of greases withstand ball and roller bearing service has been developed in the Beacon, N. Y. research laboratories of the Texas Co. This machine is said to provide in a very short time all of the more

(Turn to page 52, please)

Self-locking LOCK NUTS

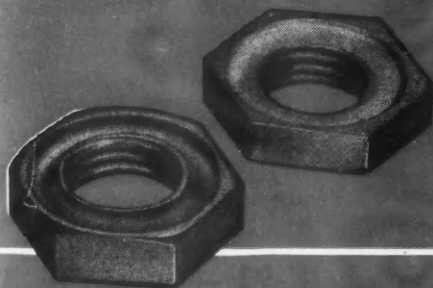
that **WON'T** shake loose

THESE 4 TYPES FIT EVERY FASTENING PROBLEM



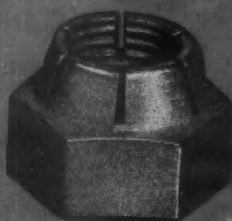
NATIONAL
"DRAKE"
LOCK NUTS

To withstand severe Stress, Shock or Vibration. Two-piece, positive lock, for use on rugged, heavy equipment, or where thickness and weight are not a factor.



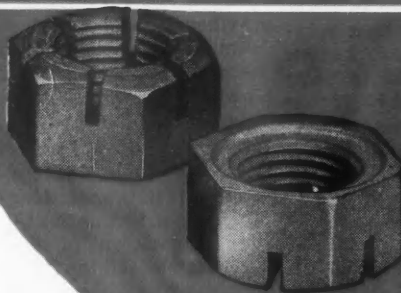
NATIONAL
"DYNAMIC"
LOCK NUTS

To withstand Shear only. For applications requiring a thin, one-piece, light weight locking nut, and where strains would be in shear only.



NATIONAL
"HUGLOCK"
NUTS

To withstand Shock-loading or Vibration—even under heat, oil or moisture. One-piece, easily installed, grips the bolt threads and maintains locking effect whether seated or not. Preset torque values, built in, insure vibration-proof results.



NATIONAL
"MARSDEN"
LOCK NUTS

For effective locking at Minimum Cost. One-piece, cantilever action type. Easily applied, free running until seated. Can be re-used with same locking efficiency.



Production executives and design engineers:

To help you select the right Lock Nut for your assembly, write today for this useful Lock Nut Booklet which gives you complete data on the engineering, design, weight and cost of these 4 "National" Lock Nuts.



THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

essential properties of ball and roller bearing greases.

Already data obtained have proved that there is no relationship between the softness of a grease and its tendency to leak and have exploded the widely held belief that a milled grease is superior to an unmilled grease for use in anti-friction bearings. The use of this machine resulted in the discovery that the texture of a grease was one of the most important factors determining whether a grease would leak or not, and not the particular hardness or softness of a grease, according to the Texas Co.

Requiring a standard run of only two hours, the apparatus can be operated at a wide variety of speeds and temperatures and requires a charge of only 32 grams. It measures the following basic grease characteristics; starting torque, running torque, maximum and running temperature, adherence of grease to bearing and housing, grease leakage, and physical or chemical changes in the grease itself.

K-88—Silent Chain Drives

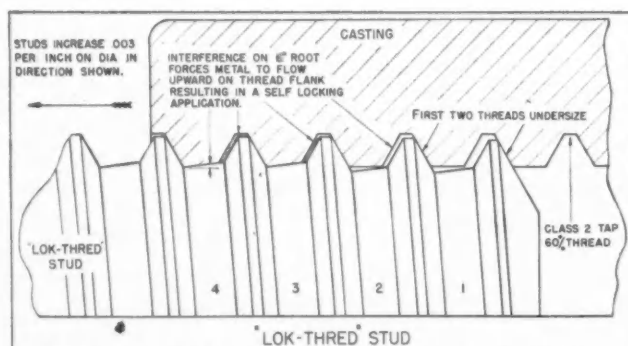
Morse Chain Co., Detroit, has announced an entirely new series of silent chain stock drives. Tooling has already been completed for the $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in. pitch chain sizes made to the new silent chain standards. The program will cover both sprockets and chains.

Henceforth, Morse cast-iron stock sizes of driven sprockets will have finished bores prepared for use with Taperlock bushings. This innovation is expected to reduce installation and replacement time considerably. Bushings will be available with finished bore diameters in increments of $\frac{1}{16}$ in.

K-89—"Lok-Thread" for Screws or Bolts

"Lok-Thread", which originally was designed for studs, now can be used for screws or bolts by the National Screw & Mfg. Co., Cleveland, Ohio.

A new principle of thread design,



Line drawing of section of "Lok-Thread"



For additional information regarding any of these items, please use coupon on page 56.

"Lok-Thread", puts the load on the six-deg angle at the root of the thread so that stresses are carried by compression transmitted to the surrounding metal. "Lok-Thread" is stronger in both tension and torsion than ordinary American National threads. It has the double advantage of locking more securely and becoming tighter in service, even under vibration or lateral motion, according to the manufacturer. With the positive sealing action of "Lok-Thread", bosses and blind tapping can be eliminated in many cases. Air and liquids are held under pressure.

The six-deg taper at the thread root is said to form an absolute seal between the two members. The higher the pressure against the stud, the tighter the two parts are forced together.

K-90—Reinforced Type Cut-Off Wheel

A new addition to the line of Norton Co., Worcester, Mass., is a reinforced type of cut-off wheel, known as the Norflex, that is said to have an unusually high safety factor against breakage plus an exceptionally fast cutting action and a low rate of wear.

The sides of the Norflex wheel present a file-like surface which enhances the wheel's cutting action. At cutting speeds which reach a maximum of 16,000 fpm at the periphery of the wheel, the concentric rows of molded "teeth" in themselves are

said to impart a highly effective cutting action, supplementing the normal cutting action of the multitude of sharp cutting points and edges presented by the Alundum abrasive cutting grains in the periphery of the wheel.

The Norflex reinforced wheel is available in three standard diameters, 14 in., 16 in., and 20 in., and in two thicknesses, $\frac{1}{4}$ in. and $\frac{3}{8}$ in. For cutting off gates and risers on non-ferrous castings of such a size or composition that frequent breakage would normally occur with conventional wheels, Norflex wheels in the softer of the three available grades, namely, O or R, are recommended by Norton. The complete markings of these wheels are A241-014BN and A241-R14BN. The $\frac{3}{8}$ in. thick wheels are recommended for unusually severe jobs requiring maximum wheel strength.

For jobs relatively free from danger of breakage, but where fast cut and long life are important, a harder wheel, A241-V10BN, is available. The grade V wheel is not as strong or flexible as either the O or R grade wheels and, therefore, should not be employed on these jobs where breakage has been a factor.

K-91 — Remote Torque Control System

Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., has developed a remote torque control system that is said to be adaptable to many industrial applications.

Already used in aircraft automatic pilot and engine control systems, boat steering apparatus, and humidity and liquid level controls, the system provides an electrical means for either manually or automatically transforming a very weak motivating force into control of a predetermined operation at a remote location with a high degree of accuracy.

The torque system comprises three units; a transmitter Autosyn (Synchro), a torque unit, and an amplifier. The position of the Autosyn rotor shaft determines the position of the torque unit output shaft. The Autosyn shaft can be set manually or by elements sensitive to pressure, temperature, humidity, volume, etc. The amplifier supplies the controlled power required to operate the torque unit.

In cases where it is desirable to have the position of the torque shaft determined by more than one regulating quantity, as for example in the control of liquid flow corrected for temperature conditions, an Autosyn differential can be applied. The signal introduced by the differential will add or subtract from the transmitter signal depending upon the wiring.

These torque systems operate from either single-phase, 110-volt, 60 cycle power, or from single-phase, 115-volt,

HYSTER *faster*



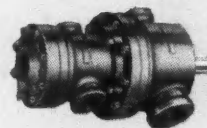
Hyster 150 Heavy Duty Industrial Lift Truck
Capacity 15,000 Pounds

WITH **VICKERS** HYDRAULIC EQUIPMENT FOR STEERING...HOISTING...TILTING

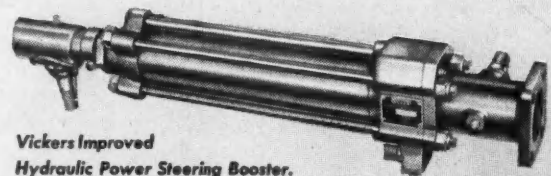
The "Hyster 150" heavy duty industrial lift truck handles more work easier and faster because it utilizes Vickers Hydraulic Equipment for steering, hoisting and tilting.

Vickers Hydraulic Power Steering Booster makes steering easy no matter how tough the going. Road shock cannot be transmitted to the steering wheel because the steering load is carried by a hydraulic cylinder—not by the driver's muscles. An integral relief valve automatically protects the system against damage by overload.

The Vickers Double Pump that supplies the power for hydraulic steering also provides oil under pressure for actuating the cylinders that lift and tilt the load. This Vickers Vane Type Pump is exceptionally efficient and dependable. The exclusive hydraulic balance construction prolongs pump life by entirely eliminating pressure-induced loads and consequent wear. The vanes provide automatic take-up so that wear has no appreciable effect on performance. In addition, the pump automatically maintains correct running clearance throughout a wide range of operating conditions.



Vickers Double Pump for simultaneously supplying power to two separate hydraulic circuits.



Vickers Improved Hydraulic Power Steering Booster.

For additional information regarding other advantages of these Vickers units, write for the following bulletins: Vickers Vane Type Pump—Bulletin 36-12. Vickers Power Steering Booster—Bulletin 47-30.

3473

VICKERS Incorporated • 1400 OAKMAN BLVD. • DETROIT 32, MICHIGAN
DIVISION OF THE SPERRY CORPORATION

Application Engineering Office:—ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEWARK
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ENGINEERS AND
BUILDERS OF
OIL HYDRAULIC
EQUIPMENT
FOR 27 YEARS

400 cycle power. Maximum static error between the transmitter Autosyn and the coupling Autosyn of the torque unit is 0.15 per cent under no load conditions, according to the manufacturer.

Several gear ratios and motor sizes are available to provide torque outputs ranging from a few gram-centimeters to several ft-lb.

K-92—Instrument for Temperature Control

Development of an instrument which makes possible accurate and close control of low-temperature processing was announced by the Brown Division of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

The new instrument is a low-temperature radiation pyrometer which has been tested in rubber and plastic mills and in continuous curing ovens and paint pigment kilns. The tests are said to have shown that low-temperature radiation control reduces rejects, speeds output, assures uniform quality and reduces power losses.

Control of low temperature through radiation pyrometry is especially useful where the measuring device does not or cannot come into contact with materials or processing equipment. The same principle has been used for years for extremely high temperature measurement and control.

K-93—Premium Quality Low Pressure Tire

Seiberling Rubber Co., Akron, Ohio, has placed on the market a premium quality extra low pressure tire. The new tire combines special features of conventional tires built by the company with advantages now made possible by the low pressure design recently adopted by the automobile industry. Trade-named "Safe-Aire", the Seiberling extra low pressure tire is said to embody features which make it one of the safest tires ever built and which justify its premium price.

Principal innovations are the company's "heat vents" in the tire shoulder, which ventilate the tread area and dissipate excess flexing heat, and a new thread design which embodies "claw grips" that extend from the saw-tooth tread at intervals.

K-94—Bullneck Type Grease Fittings

New, improved Kleenseal Bullneck Type grease fittings are now available in a wide range of sizes and styles at Lincoln Engineering Co., St. Louis 20, Mo.

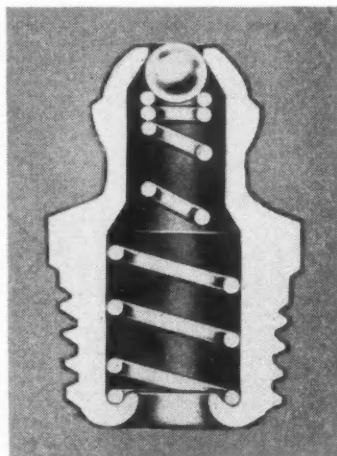
These grease fittings are said to incorporate the most desirable charac-



For additional information regarding any of these items, please use coupon on page 56

teristics of former types of high-pressure fittings and permit standardization on one, all-purpose fitting. They do not obsolete couplers and grease guns in general use today—they can be securely contacted by all commercial hydraulic couplers.

A flush ball check keeps dirt out and grease in. The head can be wiped



Kleenseal grease fitting

clean without forcing dirt into the fitting and into bearing. An enlarged neck size and projecting locking pad protect against damage and wear. The spring will not compress to restrict flow of heaviest lubricants, according to the manufacturer.

K-95—V-Belt with Nylon Cords

A nylon-reinforced V-belt has been placed on the market by United States Rubber Co., New York, N. Y. The belt contains a series of nylon cords covered with a special synthetic rubber compound capable of withstanding the deteriorating effects of heat and oil.

The belt is particularly recommended by the manufacturer for power transmission on equipment subject to rough usage. In addition to high tensile strength it has great flexi-

bility and a sufficient amount of elasticity to absorb shock, the company states.

The new belt will be distributed under the name of U. S. Royal Super Service V-belt.

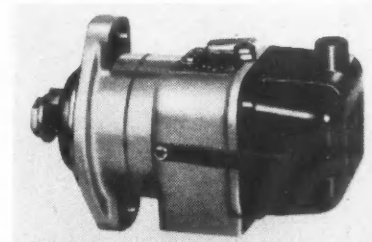
K-96—Improved Multi-Purpose Grease

To provide a single automotive grease having the proper characteristics to meet a variety of operating requirements, Socony-Vacuum Oil Co., Inc., New York, N. Y., has developed a new multi-purpose grease under the brand name Mobilgrease MP. This product is made from selected raw materials by special processes said to impart great resistance to changes in consistency despite wide changes in temperature and severe working or shock impact. It has long life because of the high chemical stability of the ingredients entering into its composition, is water resistant, and clings to bearing surfaces under all service conditions, lubricating and protecting them from harmful influences.

Mobilgrease MP is recommended by the manufacturer for chassis fittings, water pumps, wheel bearings, grease cups and grease-type universal joints. It is also suited for the main generator bearings of gasoline-electric and Diesel-electric buses. This new grease is especially recommended where high temperatures prevail.

Use of this new product is claimed to reduce stocking and application problems through elimination of several different greases having specific but limited fields of application.

K-97—Small Magneto



This new "AJ" magneto, weighing only three lb, is now in production at the Automotive Division of Thomas A. Edison, Inc., West Orange, N. J.

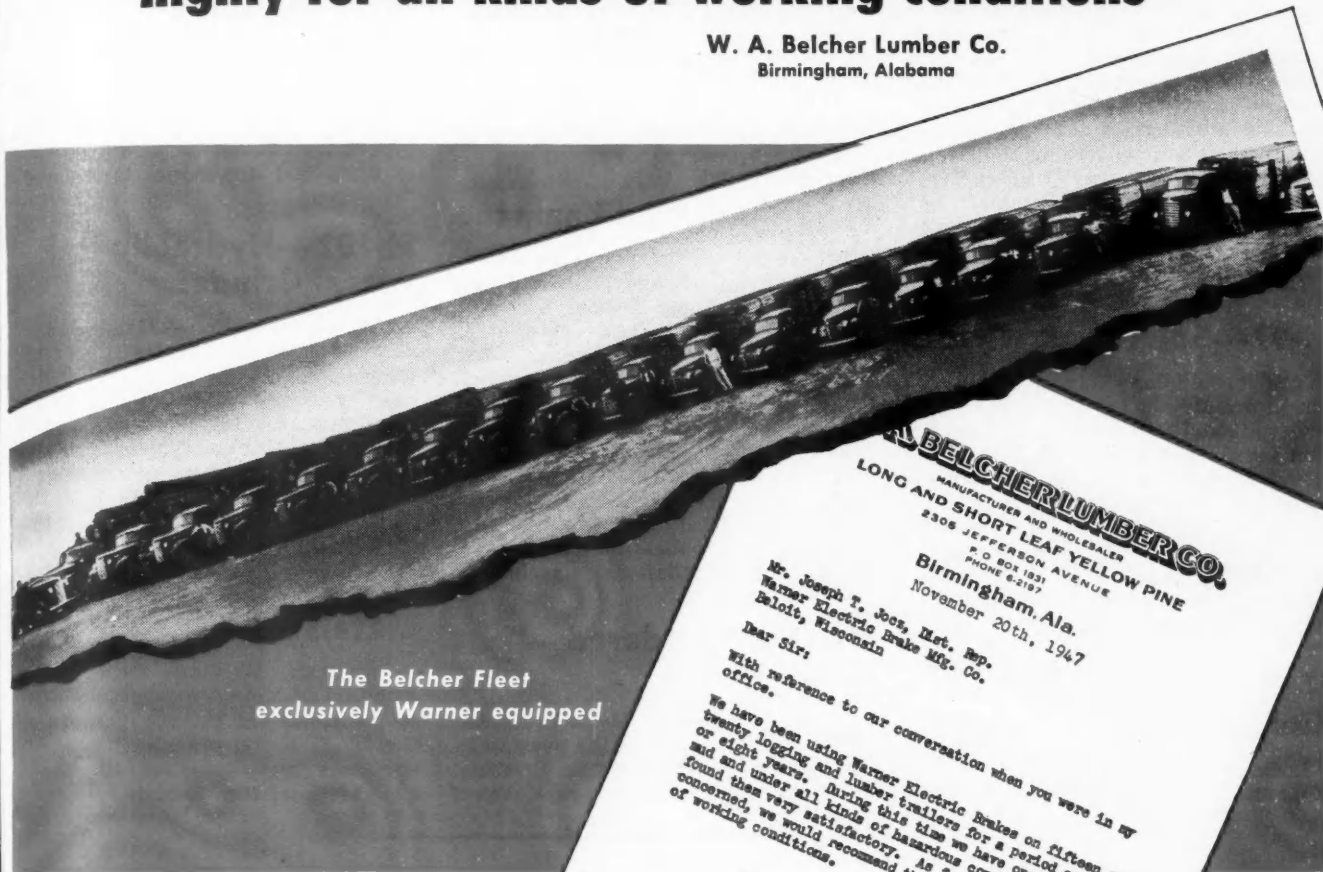
It is designed especially for small and medium one- and two-cylinder gasoline engines, and can be used on almost anything from lawnmowers, motorboats and pump engines to industrial and construction equipment.

The new magneto is small, compact and gearless. Its low shaft height makes it adaptable to various engine sizes and designs. It is built to go various types of flange mountings. All parts are said to be easily accessible.

USER REPORT:

...We would recommend Warner Electric Brakes highly for all kinds of working conditions"

W. A. Belcher Lumber Co.
Birmingham, Alabama



The Belcher Fleet
exclusively Warner equipped

W. A. BELCHER LUMBER CO.
MANUFACTURER AND WHOLESALE
LONG AND SHORT LEAF YELLOW PINE
2305 JEFFERSON AVENUE
P. O. BOX 1931
BIRMINGHAM, ALA.
PHONE 6-2197

November 20th, 1947

Mr. Joseph T. Joe, Mkt. Rep.
Warner Electric Brake Mfg. Co.
Beloit, Wisconsin

Dear Sir:

With reference to our conversation when you were in my office.

We have been using Warner Electric Brakes on fifteen or twenty logging and lumber trailers for a period of seven or eight years. During this time we have operated in mid and under all kinds of hazardous conditions, and have found them very satisfactory. As far as our company is concerned, we would recommend them highly for all kinds of working conditions.

Yours very truly,

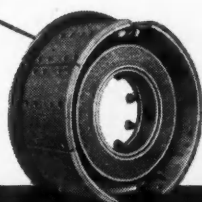
W. A. Belcher
W. A. BELCHER

Southern Lumber Operator Recommends WARNER ELECTRIC BRAKES for Best Results Under Hazardous Conditions

The grueling job of logging is hard on equipment, especially brakes, because they operate under the most hazardous conditions. Yet, after operating a fleet of Warner Brake-Equipped Trailers for eight years, Mr. Belcher unhesitatingly "highly recommends" them.

Warner Electric Brakes are fast and positive acting. Because they operate *electrically*, they give faster action and braking control not possible with any other kind of brakes. What's more, their mechanical simplicity and rugged construction make them extremely economical to maintain. Many users are still operating Warner Electric Brakes originally purchased 15 and 20 years ago!

WARNER ELECTRIC BRAKE MFG. CO.
BELOIT, WISCONSIN



Revolutionary!

Warner Electric Brakes of 2-shoe construction in sizes 16 1/2" x 5", 16 1/2" x 6" and 16 1/2" x 7". A really new concept of super-stopping power. Ask about them.

WARNER

THE ORIGINAL AND PROVEN

ELECTRIC BRAKES

SINCE 1927

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-96—Terminals

Shakeproof, Inc.—The new Shakeproof Terminals Catalog contains complete dimensional data on all Shakeproof Terminals. Dimensional data is further clarified by actual working drawings of each part. General information concerning the function, purpose and special characteristics of Shakeproof Terminals is clearly set forth in introductory pages. Parts listed and described are indexed.

H-97—Solvents

The DuBois Co.—Actusol and Solvent Information is the title of a newly revised booklet containing information on flash points, boiling ranges, chemical constitution, toxicity, trade names, etc. on solvents most frequently used in metal cleaning. It discusses the use of emulsifiable solvents and the growing popularity of emulsion cleaning and the effect on various solvent groups on particular soils.

H-98—Power-Grip Chucks

Rockford Magnetic Products Co.—Magnetic Holding Methods is the

title of a new booklet which provides information on material holding. The various chapters are illustrated with actual production photographs. The catalog section includes illustrations and specifications for the Power-Grip Standard Chuck; Viking Chuck; Rotating Chuck; Hand Magnets, Separators and Hoist Magnets.

H-99—Infrared Lamps

Westinghouse Electric Corp., Lamp Div.—A new, 16-page booklet Modern Baking, Drying, Heating with Industrial Infrared Lamps gives case histories to show how infrared cuts costs, speeds production and saves space wherever heat is required for dehydrating, finish baking or mass heating. It discusses four major types of installations—the portable or non-oven type, the single-walled oven, the double-walled oven and the insulated oven. Application data to aid in planning installations is included.

H-100—Powdered Metal Parts

Michigan Powdered Metal Products Co. Inc.—Advantages of the powdered metal process of producing finished parts are outlined in a 4-page illus-

trated bulletin. It also illustrates and describes the research and production facilities offered by the company for manufacture of powdered metal parts of all kinds.

H-101—Non-Rotating Air Motors

The Bellows Co.—Bulletin BM-20 shows the various types of Bellows Air Motors. Accompanying the illustrations of the different types of motors is a description of the special features. Application photographs are given, together with dimensional drawings and specifications of each type motor. A list of packaged power units and accessories is included.

H-102—Hydraulic Universal Grinder

Landis Tool Co.—Catalog J.48 describes and illustrates the company's 14 and 18 inch Type C Hydraulic Universal Grinder. The illustrations in the 16-page booklet show machine features, typical grinding operations and accessory equipment. Complete specifications for both the 14 and 18 inch machines are included.

H-103—The Fracture of Metals

American Welding Society—The Fracture of Metals, a report, in booklet form, to the Bureau of Ships of the U. S. Navy, provides means for engineers and designers to intelligently (Please turn to page 76)

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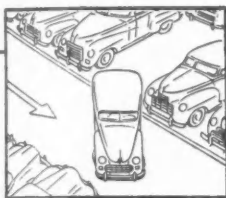
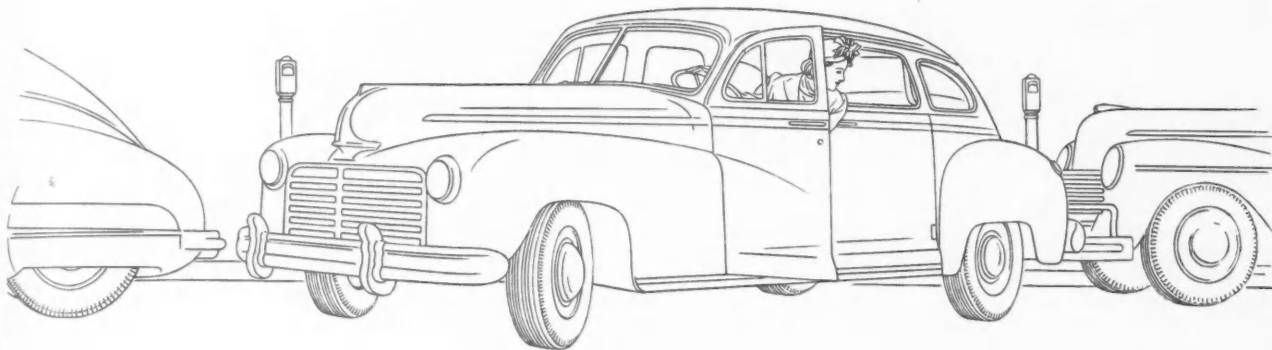
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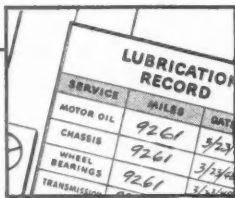
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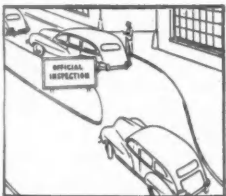
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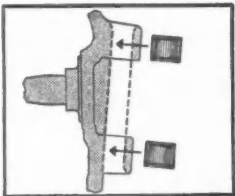
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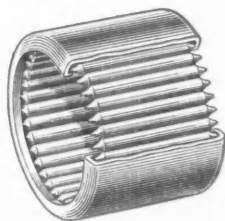
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Small Simple Machine

(Continued from page 46)

an outside length of only 12½ in. As shown in the phantom drawing of Fig. 2, it utilizes the four-square or Hopkinson coupling. Two parallel shafts are connected by two pairs of gears, as shown in Fig. 3, so that the power required to operate the rig is only the friction horsepower of the gears and bearings. The small spur gears are the replaceable test specimens, while the large helical gears are permanent.

Feature of the machine is the application of load to the test gears by axial movement of one helical gear relative to the other, accomplished by applying a known oil pressure to the piston-like hubs of the helical gears. From the helix angle and the area of the hubs, the tangential load may be calculated. The extended shaft carries a V-belt pulley and is driven by a 10-hp electric motor, preferably of a variable speed type.

Oil is supplied by a motor and pump to three separate places: the loading pistons which determine the gear load, 25 psi to the six sleeve bearings, adjustable oil pressure to one or more squirts which play on the test gear teeth.

The housing is divided into two com-

partments, one for the main gears and one for the test gears. These are scavenged separately. A heat exchanger is provided to regulate the oil temperature and thus control the general temperature of the rig.

The driving shaft is located endwise between shoulders of the front and middle bushings, while the driven shaft has freedom to move endwise about ¼ in. When the gears are turning, this end movement is accomplished without friction. The method of measuring the load on the test gears by oil pressure is accurate enough for all practical purposes and permits a very simple construction.

Removal and replacement of the test gears is easily done by taking off the left-hand cover plate. This exposes the nuts and tab washers which hold the test gears in place on the two shafts. After running one test, the same gears may be reversed to run on the other sides of the teeth. Since the test gears are separated from the main gears by a partition in the housing, it is seldom necessary to disassemble the machine completely, since any debris from the test gears is caught by a filter in the oil line.

In the rear cover, there are two plug holes in line with the test gears. When running fatigue tests, surface failure is noted when surface pitting has reached a certain severity. The machine is stopped at intervals, depending on the expected life of the specimens, and a lamp and microscope are mounted at one inspection hole. The gears are then turned over slowly by hand and the condition of the teeth noted. This is compared with a reference sample previously adopted as a standard.

Conditions can be set up to produce scuffing or scoring instead of pitting. The viscosity, temperature, and flow rate of the oil can be varied, and gears may have different hardness or surface finish. Scuffing tests are completed quickly, since it is not necessary to run very long after conditions are stabilized.

The two mating test gears have the same number of teeth, so that examination after run-in will show any gross error in tooth form or finish, and eccentricity or uneven hardness is easily detected. It is felt that for fatigue testing also, hunting teeth would be objectionable.

Cylinder Wear and Distortion

(Continued from page 38)

mined, the true axis of the cylinder.

If this axis of measurement is so situated within the cylinder that the radii at three equally spaced radial locations around the top end of the cylinder are equal and the same requirement fulfilled at the lower end of the cylinder, the axis of measurement may then be assumed to be as nearly coincident with the cylinder axis as is possible. This, briefly, is the principle followed in locating the axis of measurement of the contour gage within the cylinder to be measured.

The contour gage (Fig. 1) consists of a 0.0001 in. reading dial indicator on the lower end of a 2½ in. diam. tubular gage shaft mounted in such a way that it may be accurately centered in the cylinder and then raised, lowered, or rotated to bring the indicator into position to explore any desired cylinder wall location.

A heavy base casting supports the gage shaft by means of three bearing shoes, one of which is spring loaded to maintain constant gage shaft alignment within the base casting. The gage shaft may be rotated by means of capstan pins and raised or lowered by means of a hand wheel which, through a bevel gear, turns a lead screw which is threaded into a collar on the upper end of the gage

shaft.

The indicator is mounted on the lower end of the gage shaft in a horizontal position. An optical system mounted on the upper end of the hollow gage shaft provides an enlarged view of the indicator dial. The optical system remains stationary regardless of gage shaft rotation. Adjustment of indicator for cylinder size is accomplished by proper selection of insert between the indicator and the contact point. The contact point is a 0.030 in. radius tungsten carbide button on which wear is negligible. Total indicator travel is 0.060 in.

In setting up the gage for cylinder contour investigation, an auxiliary adapter casting is employed. This casting is toe-clamped to the top of the engine block in approximate alignment with the cylinder to be measured. In the case of aircraft type individual cylinders, the adapter casting is fastened to the flange around the lower end of the barrel. The contour gage is then positioned on top of the adapter casting (Fig. 2). Centering screws pass through an annular ring on the bottom of the base casting and bear on the sides of the adapter casting. These screws are located at 120 deg intervals around the base and allow the entire contour gage assembly to be shifted

laterally as necessary to center the gage shaft at the upper end of the cylinder. Accurate centering is assured by equal indicator readings at the three equally spaced locations around the cylinder.

Since the axis of the cylinder bore is generally not exactly perpendicular to the top of the block, it is necessary to recenter the indicator at the lower end of the cylinder. This is accomplished by aligning screws which pass through the base casting and bear on the top of the adapter casting. These screws are adjusted until centering is again indicated. It is necessary to go through the centering process several times since an adjustment at one end of the cylinder partially nullifies the previous adjustment at the other end.

After the centering adjustment has been completed, indicator readings can be taken at as many points as necessary to define accurately cylinder contour. In a new cylinder, readings at 20 deg intervals around the cylinder and at 1/4 or 1/2 in. vertical increments are usually adequate. In a worn or badly distorted cylinder, readings at closer intervals are often necessary. This is particularly true in a used cylinder where the true wear pattern within the ring travel is desired.

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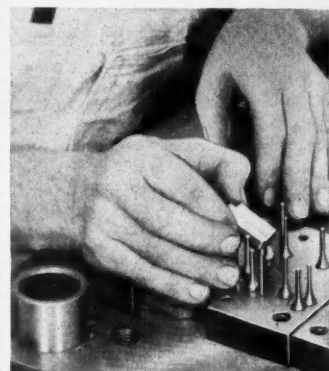
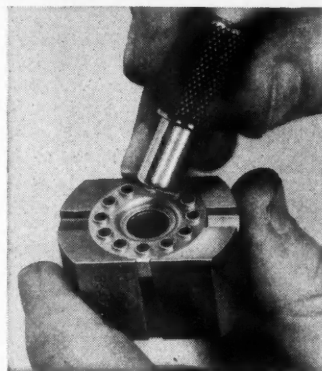
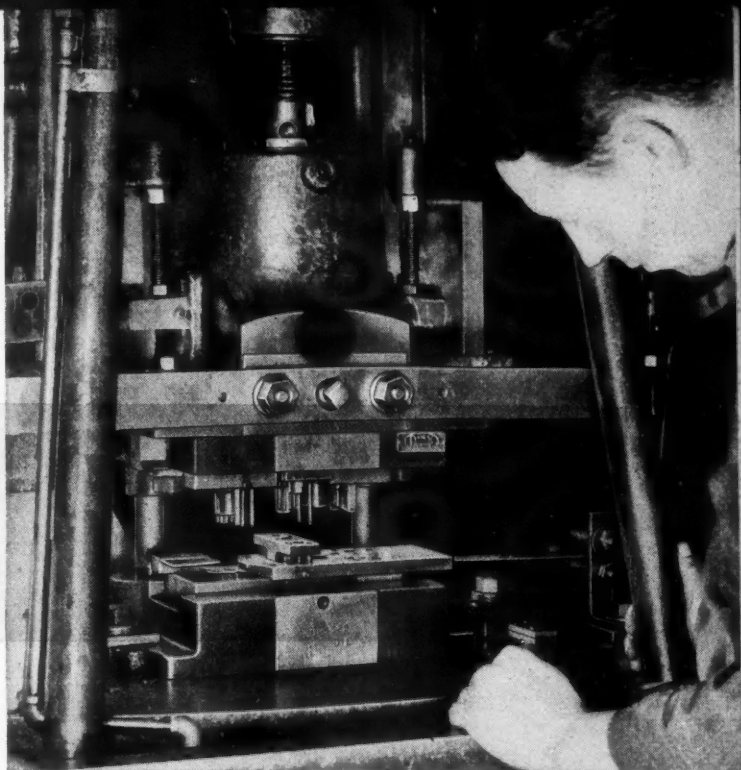
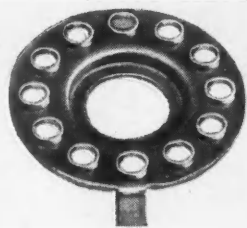
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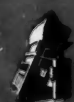
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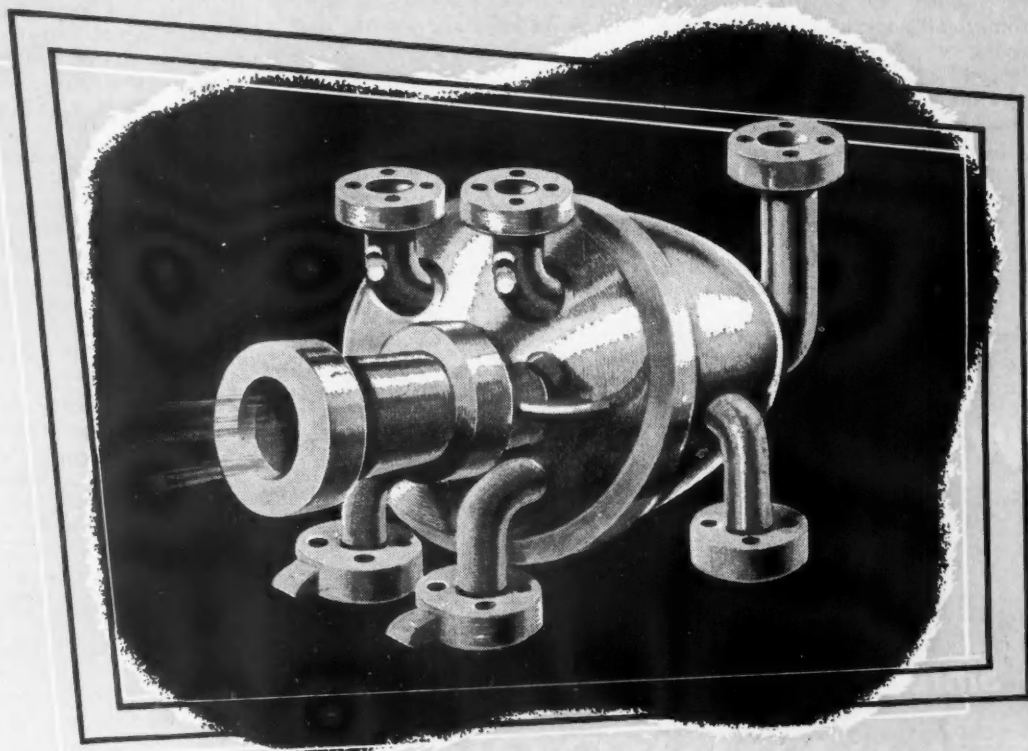


Alcohol-Water Injection

(Continued from page 36)

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Massey-Harris' New Setup

(Continued from page 26)

final form the cabinet will be fitted with an automatically-operated fixture for revolving the gears at a pre-determined speed while two fixed nozzles impinge on both sides of the teeth simultaneously.

Metallurgy and heat treating also are of advanced nature. All carburizing is handled in the familiar Holcroft gas carburizing furnaces; then quenching is done automatically in a

conveyorized tank outside the furnace. The gears then are washed and drawn at a suitable temperature in another furnace.

The general management of tractor assembly may be visualized from the several views reproduced here. Final assembly is organized in three individual lines but without formal conveyorization owing to the relatively moderate flow of work. It be-

gins with the major sub-assemblies—sub-assembly of the frame, and assembly of the transmission at the start of the line, followed by joining the two into an integral backbone. Sub-assembly operations all along the line are arranged in the usual manner directly near the point of application and served by bins containing the necessary component parts and fastenings required at each stage.

Engines are prepared for installation on a separate assembly line, then transported to the final lines on an overhead rail. This conveyor traverses the three lines directly at the engine drop station. Air tools of portable type are used exclusively and are mounted in convenient location along each of the sub-assembly and assembly stations.

As the assembly progresses along the line it is fitted with the front end sheet metal, front axle and wheels, fenders, Velvet-Cushion suspended seat, etc. After the assembly has been completed—save for installation of rear wheel and tire assemblies—the tractors move through a spray booth for the coating of a standard finish. Following this they are hooked onto a power-driven floor conveyor for a trip through the drying oven. This is a large drying oven running some 117 ft. in length with a drying cycle of about 45 minutes. It is of recirculating type with heated air circulated from the overhead gas heating unit. Generally speaking the oven has two phases—the initial heating phase, and a cooling phase to bring the work down approximately to room temperature.

From the standpoint of worker comfort and safety as well as good housekeeping the plant painting scheme deserves particular mention. In keeping with advanced practice, all of the machinery is painted in color—a pleasing green hue for the body of the machine, and a contrasting cream for moving parts and fixtures.

Inflation

(Continued from page 27)

period 1929 through 1946, and \$62.6 billions for the period 1929 through 1947. Underdepreciation for the period 1929 through 1946, therefore, was approximately the same as corporate net income (after all taxes) for this same period. On the basis of December, 1947 replacement costs, however, under-depreciation amounted to \$75.4 billions as against corporate net income for manufacturing industries of \$62.6 billions, or \$12.8 billions or 20 percent more than corporate net income received during the entire period.

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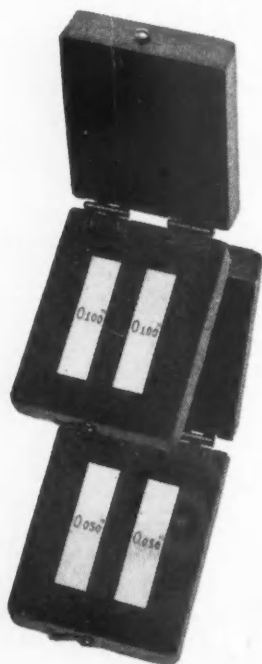


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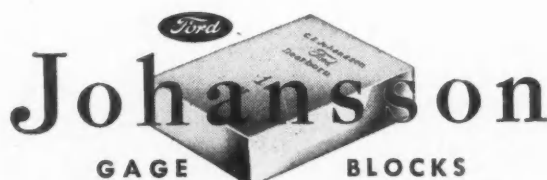
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Transmissions

(Continued from page 45)

double planetary pinions carried by the flywheel. The clutches are actuated by oil pressure, obtained either by a gear pump built into the transmission or from the engine lubricating system, and the oil is led to synthetic rubber diaphragms which transmit the force to the pressure plates. A valve known as a "trafficking valve," is incorporated in one or both of the clutches and engages the clutch automatically at a predetermined engine speed. As engine

revolutions are reduced, the valve moves inward under the pressure of a coil spring, opening an exhaust port, and relieving the oil pressure on the diaphragm, thus releasing the clutch. On taking up the drive, centrifugal force assures the initial movement of the valve and provides the drive without the lag which might occur while the space behind the diaphragm is being filled.

The first of the two sun wheels is on the end of a sleeve shaft which carries brake drum D and which has another sun wheel on its rear end. The second sun wheel of the first pair is on a second concentric sleeve

shaft which carries clutch B and brake plate C. Clutch A on the inner intermediate shaft also carries a cage for double planetary pinions, engaging with the sun wheel on the first sleeve shaft and with a sun wheel on a short sleeve receiving the ring gear of the epicyclic train. Both the sleeve and the annulus have teeth with which the sliding dog clutch F can engage. The transmission case also carries pawls E, forming a detent to lock the pinion cage and the inner intermediate shaft, as required. The dog clutch F is made use of to provide over-drive ratios, and is hydraulically operated. This transmission has not yet been put into production.

The Chatelet-Michellet electro-magnetic epicyclic transmission provides four speeds ahead and four in reverse, with no consumption of current when running in high. It consists of two trains, with two synchronizing cone clutches and two stationary electro magnets anchored to the transmission housing. As shown in Fig. 2, on first gear the electrodes M and N are energized. The crown 4 and the planet carrier 5 are locked and the cones 2 and 3 disengaged. The planetary cone 2 being free therefore drives through the trains A and B giving successive reductions.

On second gear the magnet M is alone energized and the train A gives the reduction. The train B is locked on the cone 3 by the thrust 1. Thus the train B transmits the whole of the movement received from train A.

For third gear the magnet N is energized and the train A is locked on the cone 2 through the thrust 1. Thus the train B assures the reduction. On high gear the two magnets are cut out, the trains A and B are locked on their respective cones 2 and 3 by the thrust 1. This assures direct drive. A mechanical efficiency of 96 per cent is claimed for this transmission.

One of the advantages of the Gravina clutch, compared with the conventional automatic clutch, is that it gives a complete break of the drive. On the driven shaft is a floating member carrying a flange on which are a series of bob weights, as shown in Fig. 3. When the switch C is closed the magnet 1 is energized. This magnet, which is attached to the clutch housing, attracts the armature 2 which is secured to the plate 3 carrying the bob weights 4. The clutch is then completely disengaged. To assure engagement the current is cut at C and the centrifugal unit is pressed forward by the spring 5, bringing the disk 6 attached to the flywheel assembly in contact with the disc 7 on the centrifugal unit. By the centrifugal force of the bob weights 4, the clutch plate 8 is brought in contact with the plate 9, assuring the drive. The device therefore consists of a small auxiliary clutch causing the centrifugal assembly to rotate.

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BLACOSOLV
DEGREASERS AND SOLVENT

NIAGARA
METAL PARTS WASHERS

Special Equipment at ASTE Exposition

At the Sixth Industrial Exposition of the American Society of Tool Engineers in March at Cleveland, a total of 336 exhibitors displayed an impressive variety of products. The program this year was held to two evening technical sessions and the banquet which was addressed by James D. Mooney, president and board chairman, Willys-Overland Motors, Inc. The major activity, apart from the Exposition, was centered in a series of plant tours.

The Exposition featured tools, fixtures, and accessories for machine tools of every variety, including abrasives, gages and inspection devices, pumps, motors, and materials handling devices. Displays of small lathes and drill presses also were found. Some of the leading suppliers in the metallurgical field, such as Amplex Div., Chrysler Corp., exhibited examples of powder metallurgy and several makes of precision castings. In addition to many kinds of small tools and cutters, there were a number of exhibits featuring broaching tools.

Although this was not a machine tool show in any sense, it did afford a springboard for offerings of European machinery builders. Cosa Corp., an importer of machinery, had an enormous booth displaying the latest models of Swiss jig borers which are making a fresh bid for American markets.

Because of the variety of products shown by the 336 manufacturers, it would be impractical to attempt to describe all of the exhibitions. However, there were a few items of unusual interest which were displayed for the first time.

Hailed as a revolutionary development in threading machines is the Cri-Dan semi-automatic, high-speed threading machine to be marketed in the U. S. A. by Lees-Bradner. The machine is of French design, currently built in England. Within its range of work diameter, the Cri-Dan threader will produce threads on any common material including hardened steel parts, using a cemented-carbide-tipped tool cutting at exceptionally high surface speeds.

Pratt and Whitney Division put on an arresting display of precision gages designed specifically for automotive applications, such as the checking of pistons and connecting rods. These are intricate multi-point instruments capable of checking a multiplicity of dimensions in a single setting. Major feature of these instruments is the ability to combine in a single unit the features of the Electrolimit gage, an air gage, and direct contact electric gage. The piston gage, for example, can check the pin bores, ring grooves, and alignment of the pin bore in one setting with indicators for each function.

The new connecting rod gage gives readings on each of the bores and provides a precise check on the alignment of bores in the principal planes.

Kellerflex Pratt and Whitney emphasized the amazing improvement in burring operations since the war, demonstrating the use of cemented-carbide burrs which are capable of running at speeds up to 33,000 rpm and cutting steel hardened to Rockwell 65 C.

Eastman Kodak introduced the Kodak Conju-Gage, a unique electronic gear inspection machine. It has an automatically recording chart which provides in a single sine-form curve all of the pertinent data required for checking a gear.

Marking an innovation in automotive practice was the largest granite precision surface plate. This was recently delivered to the City Auto Stamping Co. by the Herman Stone Co., Dayton, Ohio. The plate measures 8 ft by 16 ft, weighs approximately 25 tons, and is finished to a flatness of 0.002 in. over the entire area. It will be used for checking large autobody stampings and complete bodies.

The Fonda Gage Co., Stamford, Conn., showed a square style gage block, an addition to its line of Life-time-Carbide gage blocks, in a full range of sets and sizes heretofore available only in rectangular form.

EXACT PRESSURE CONTROL. Accurate, sensitive; secondary pressure setting repeats exactly regardless of fluctuating flow conditions. For use on primary air pressures up to 150 p.s.i. Maintains any desired secondary pressure from 5 to 125 p.s.i.

EASY TO "BACK OFF" PRESSURE. Instant downward pressure adjustment merely by turning control knob. Ideal for reducing cylinder pressure without exhausting control valve.

NO PRESSURE BUILD-UP. Absolute stability of secondary pressure

even under dead end conditions.

FINE QUALITY. Small, compact, and moderately priced, but unexcelled for precision construction. Nylon valve seats. Instrument type control knob and fine threaded adjusting screw. All non-corrosive materials. Built-in fine mesh bronze strainer. Sizes 3/8" and 1/2".

ENGINEERING RECOMMENDATIONS. If you use or if you build air operated equipment, ask for Hannifin engineering recommendations. New bulletin on request.

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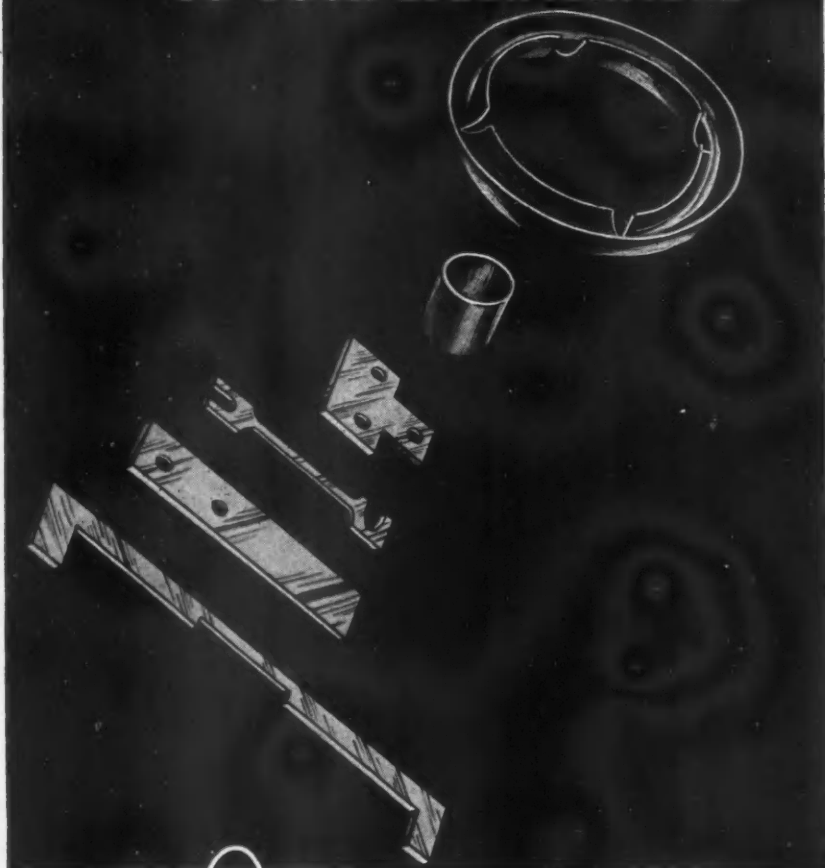
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OUR EXPERIENCE, precision machines, materials and methods enable us to offer accurately produced stampings in any quantity, cut to your tolerances.

Send sketches, blueprints, or samples, and let us quote according to production methods eliminating wasted material and time.

3036

LAMINATED SHIM COMPANY

INCORPORATED

GLENBROOK, CONNECTICUT

Fifty Years Oldsmobiles

(Continued from page 33)

\$50,000 went to the original stockholders, \$150,000 cash went into the treasury, and \$150,000 was represented by assets furnished by the old company. A large new plant was built and equipped on Detroit's river front.

During the next two years the bulk of the company's business was manufacture of gasoline engines. At the same time, development work went on with automobiles, including electrics, of which kind one or two were actually made and sold. It was a period of hesitation and uncertainty about what kind of car to market, with the bulk of the opinion leaning to a large and more expensive car. Then, in 1901, occurred one of those fateful strokes of fortune which have made or broken so many companies. A fire swept the Detroit plant, destroying all buildings but the foundry. All the car models under consideration were destroyed except for a small curved dash runabout which James Brady, then traffic manager for the company, managed to trundle out safely. All drawings, patterns and records were lost. As a result, the board of directors decided to concentrate on the single small model that had been saved and to build it in large quantities. The foundry building was hastily converted to a machine shop and within 30 days, after what F. L. Smith later called "our blessed disaster," the first car was built. It was found that the small one-cylinder automobile could be built to retail at \$650 and earn a handsome profit.

Success of the new car was immediate and phenomenal. In 1905, production was 5500 units. Returns to original stockholders also were momentous. At the end of three years, original stockholders had realized 105 per cent of their investment in dividends, and the company had increased its capitalization to \$2 million. The company certainly was the first of its kind to be a financial success. Not only did early investors get their money back in three years, but their stock increased five-fold in five years. Eight years after the company was organized, it became a unit of General Motors, and stockholders could exchange their stock for GM common or preferred shares on the basis of 18 shares of common stock for every \$100 worth of Olds Motor Works holdings. More important, they received original GM stock which has since been multiplied many times. The Olds stockholders took the GM stock in the ratio of 80 per

(Turn to page 70, please)

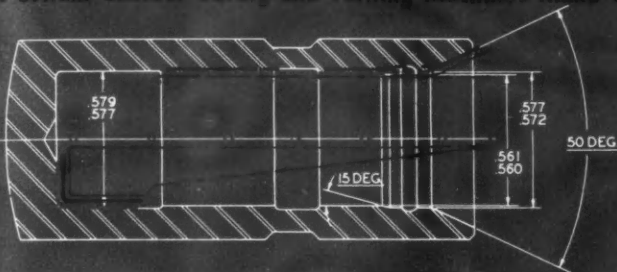
SINGLE POINT BORE MANY DIAMETERS

Manufacturer

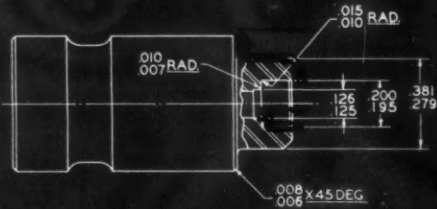
- Saves Machines
- Saves Tools
- Saves Time



New Britain Contour Boring and Turning Machines Make These Parts



Lash adjuster body - 229 pieces per hour



Plunger - 393 pieces per hour

Generating contours instead of plunge cutting enables this manufacturer of automotive parts to handle multiple operations with more dependable accuracy, better finish and greater production. New Britain Contour Boring and Turning Machines kept down the original investment and the operating cost per piece in

the manufacture of the valve assembly parts schematically illustrated above.

Each part is machined on a New Britain Model 36 equipped with contour slide. In both instances two single point tools are used. Twelve operations are performed on the steel plunger. The first tool machines the specified surfaces of the O. D. and faces the end. The second tool is then indexed into position and performs the critical boring operations.

Boring the cast iron lash adjuster body is completed in two stages. The first tool, accurately following its cams, bores two different angles and two diameters. The second tool, indexed into position by the contour slide, is jumped to the bottom of the bore to complete the three remaining operations.

The trend to the *automatic* way of cutting metals is making itself felt throughout the industry in increased production and higher profits. You too can broaden your profit margins by turning expensive boring and turning operations into profitable productivity.

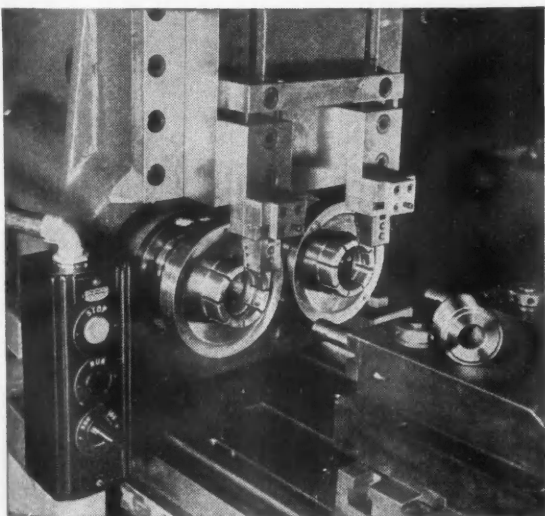
NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE!



NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT



SET-UP FOR MACHINING REVERSE PLANET PINIONS
Vertical slides present two facing tools to the piece while the boring tool is in operation. On many jobs such an arrangement can reduce cycle time as much as 50%.

Oldsmobile

(Continued from page 68)

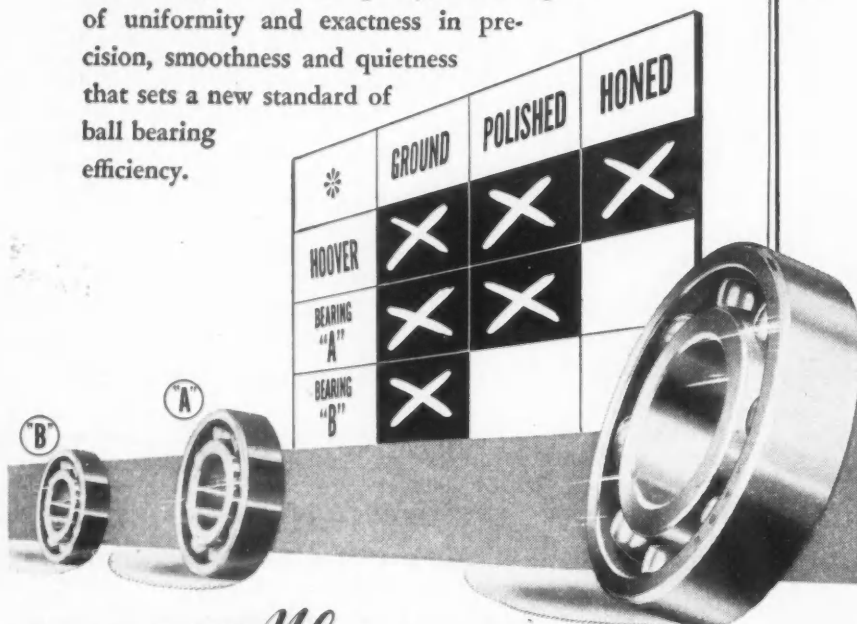
cent preferred and 20 per cent common.

By the time General Motors acquired Oldsmobile, operations were centered in Lansing, the Detroit plant being abandoned in 1905. During the five-year period immediately preceding GM ownership, Oldsmobile had continued development work, introducing two-, four-, and six-cylinder cars. In 1910, it brought out the famous Limited model, with five-in.

bore, six-in. stroke, and 42-in. wheels. It continued its growth steadily and at the close of World War I had converted a new plant built for airplane engines to manufacture of automobile engines. In 1923, the company brought out a low priced six which sold for \$750, and thereafter steadily improved its position in that field. In 1932, Olds introduced its straight eight line to complement the six, and has offered both types since that time. Its role in World War II is well known, and now, three years after war's end, the division is a leading producer of automobiles, standing eighth in the industry.

Out front in the Raceway race *

Hoover Ball Bearings win in the raceway race because they are ground, polished and honed. Hoover is the only ball bearing manufacturer taking the third step . . . honing the raceway. The honed raceway is an exclusive Hoover feature that pays off Hoover customers with 30% longer bearing life, 30% greater load capacity, and a degree of uniformity and exactness in precision, smoothness and quietness that sets a new standard of ball bearing efficiency.



THE ARISTOCRAT
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America's only Ball Bearing
with HONED RACEWAYS

HOOVER BALL AND BEARING CO., ANN ARBOR, MICH.

In reviewing Oldsmobile history, a noticeable factor is the number of famous automotive men who were at one time or another connected directly or indirectly with the company. This list is impressive and includes the following: R. E. Olds, founder, who left the company in 1903 and later helped organize Reo at Lansing; the Dodge Brothers who got established in the automobile industry through an order for 2000 engines; and Roy D. Chapin and Howard E. Coffin, chief engineer, both of whom left Oldsmobile to form with Hugh Chalmers and R. E. Thomas the Thomas-Detroit Co., builder of the Thomas Flier. This concern later became the Chalmers-Detroit Co. when Chapin and Coffin left it to found the present Hudson Motor Car Co. with the backing of J. L. Hudson, Detroit merchant. Henry M. Leland, one of the founders of Cadillac, also was aided by Olds' business through an order for 2000 engines to Leland-Faulconer Co. J. D. Maxwell, one of the early engineers for Olds, later was a founder of Maxwell-Chalmers Co. which was the predecessor to the present Chrysler Corporation. Fred Fisher, of the Fisher Brothers, was associated with Wilson Body Co. which furnished bodies to Oldsmobile and later with his brothers formed the Fisher Body Co. in 1908 and sold bodies to Oldsmobile. Alfred P. Sloane, Jr., gives credit to a large order from Oldsmobile for giving his Hyatt Roller Bearing Co. a sendoff into the automotive parts business in its early days. Robert Hupp, another automotive pioneer, joined Olds in 1897, and later founded the Hupp Motor Co. There are many more names that could be added to the list of men who were influenced in some way by the Olds Motor Works in those early days. Because it was the first successful automobile manufacturer, it undoubtedly contributed greatly to centering the industry in Detroit and Michigan and lent impetus to capital investments in similar companies.

Oldsmobile

(Continued from page 33)

Year	Noteworthy Events
1909	First Oldsmobiles with closed bodies. Employees—1052.
1910	New Assembly Plant built. Famous Olds "Limited" introduced. William Harnden Foster painted "Setting the Pace." Employees—850.
1911	First self-starter (air type) installed. Employees—915.
1912	Addition to assembly plant made. Employees—563.
1913	Cars equipped with Delco ignition and starting system. Employees—276.
1914	Low priced four-cylinder Oldsmobile introduced. Employees—600.
1915	Left hand drive now on all models. Top and windshield became standard equipment. Employees—2000.
1916	First volume production of closed cars begun. Women's transcontinental record smashed. Employees—3600.

(Turn to page 72, please)

Logan

A NAME TO REMEMBER
WHEN YOU THINK OF BETTER
LATHES AND SHAPERS

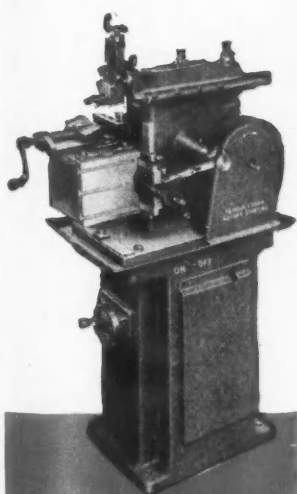


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prices start at
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SUSTAINED ACCURACY AND
LASTING DEPENDABILITY



LOGAN 7" SHAPER

V and flat ways of the heavy-ribbed Logan Lathe bed are held to within .0005" of parallelism. The front bearing seat on the Logan Lathe ball bearing mounted spindle can vary no more than .0002". Total spindle runout 12 inches from the bearing is less than .0008". To hold to tolerances like these, one of every seven men building Logan Lathes is an inspector, skilled in the use of the most modern precision instruments. Operations, individual parts, sub-assemblies and completed machines are checked. That is why the Logan Lathe has earned a reputation for sustained accuracy and dependable, low-cost service in all fields of industry. Full information on the complete line of Logan Lathes and Shapers at your Logan dealer's, or on written request.

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½" . . . bed length, 43⅞" . . . size of hole through spindle, 25/32" . . . spindle nose diameter and threads per inch, 1½"—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision-ground ways, 2 V-ways and 2 flat ways.

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S-1

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

May 1, 1948

71

Oldsmobile

(Continued from page 70)

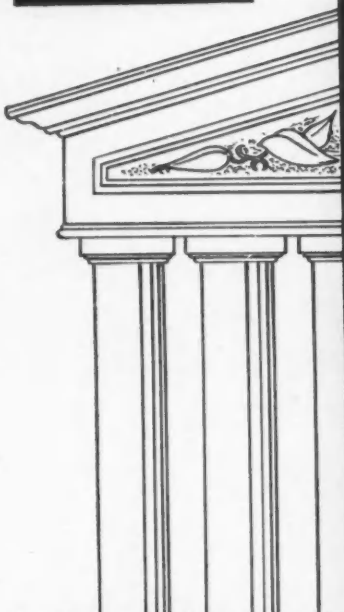
- 1917 Began building kitchen trailers for Army use and prepared to build Liberty Aircraft Engines. First aluminum pistons used. Employees—4000.
- 1918 New motor plant completed.
- 1919 Highest production in history of company. Expansion program started. Employees—4000.
- 1920 Expansion program completed. New buildings included assembly, axle, sheet metal, and enameling plants. Employees—3890.
- 1921 New light eight-cylinder Oldsmobile presented. Employees—2500.
- 1922 Speed record of 67 mph for 15 hr set by Oldsmobile eight. Employees—2500.
- 1923 A six-cylinder car built to sell at \$750. "Cannon Ball" Baker completed transcontinental run from New York to Los

- Angeles in 12½ days with Model 30-A locked in high gear. Employees—3600.
- 1924 Fisher Body Plant started in Lansing. Employees—4200.
- 1925 Balloon tires available. Employees—4250.
- 1926 Chromium plating introduced by Oldsmobile. Employees—4458.
- 1927 Oldsmobile adopted four-wheel brakes. Employees—4350.
- 1928 Greatest employment record to date in Oldsmobile's history—5560.
- 1929 Greatest production volume to date reached—surpassing 100,000 for first time. New Motor and Axle Plants and Experimental Building completed. New Oldsmobile crest adopted. Employees—7213.
- 1930 New Administration Building completed; cars were streamlined. Employees—5600.
- 1931 Downdraft carburetion and synco-mesh transmission introduced. Employees—4623.
- 1932 Straight Eight introduced as a companion car to the Six. Cars equipped with automatic choke. Employees—4029.
- 1933 Oldsmobile acclaimed as style leader. Employees—3980.

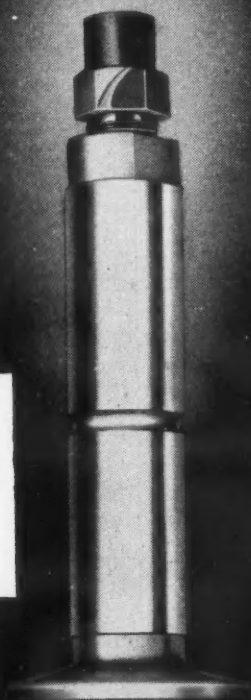
- 1934 All Feature Six with knee action wheels and super hydraulic brakes was introduced. Further plant expansion was begun. Employees—6431.
- 1935 All previous sales and production records broken—production 152,491. 48-acre site acquired and work begun on 21 modern buildings to increase production facilities. Solid steel turret-top bodies introduced. Light weight, electro-hardened aluminum pistons adopted. Employees—7271.
- 1936 Expansion program completed at approximate cost of \$6,000,000. New Engineering Building, with auditorium, constructed. Larger and more powerful engines (95 hp Six and 110 hp Eight) introduced. New assembly plants in Linden, N. J. and Southgate, Calif., began assembly of 1937 models. New all-time high production record achieved. Employees—8507.
- 1937 Year marked greatest production and sales activity in organization's history. Production—212,331 units. Automatic safety transmission introduced as optional extra on both six and eight cylinder models. New Customer Drive-Away Building completed and put into use. Employees—8727.
- 1938 New all-time daily production record of 1379 cars achieved on November 11. Three series of cars introduced—the Sixty and Seventy with Six-Cylinder engines and the Eighty with an Eight-Cylinder engine. Quadri-Coil Springs, with Four-Way Stabilization introduced, eliminating leaf springs at rear. Employees—7854.
- 1939 Oldsmobile introduced Hydra-Matic Drive, a combination of liquid coupling and fully automatic, four speed forward transmission. Employees—8871.
- 1940 Three series of cars introduced—the Special, Dynamic Cruiser and Custom Cruiser—each available with either a 100 hp six or a 110 hp eight-cylinder engine. New calendar-year high in production—215,028 units. Employees—7711.
- 1941 Calendar-year production record again broken—230,701 cars. Sales of Hydra-Matic Drive-equipped cars reached total of 113,690. Two millionth Oldsmobile car produced during year. Defense production begun in newly acquired Forge Plant. Employees—9762.
- 1942-45 Automobile production ceased Feb. 5, 1942 with the building of the 12,230th car of the 1942 model. Plants were converted to war production exclusively. 11,213 was high point in employment during war period. 9416 employees four-year average. Forge plant re-built; doubled in size and productive capacity increased many-fold.
- 1945 Following V-J Day Oldsmobile plants converted to automobile production again, with first of 1946 models built October 15, 1945. Plant closed Nov. 21, 1945 as result of nationwide UAW-CIO strike against GM plants.
- 1946 Strike settled in April and production resumed in plants about April 10. Total of 119,328 cars produced in 1946 model year. A total of 12,891 Valiant Oldsmobiles built and delivered. Employees—7908.
- 1947 1947 model car in production by mid-January. Division produced 194,388 units of 1947 model, including export. Total of 26,344 Valiant Oldsmobiles delivered by end of 1947. More than 89 per cent of 1947 Oldsmobiles built for domestic sale were equipped with General Motors Hydra-Matic Drive. Percentage of Hydra-Matic Drive units to total production, including export, reached all-time high of 85.9 per cent. Employees—8662.
- 1948 Production of newly designed "Futuramic" Series "98" Oldsmobile started January 15, 1948. "Dynamic" Series "60" and "70" models offered in 1948 line in popular medium-price field. Employees—8800.

pillars

of engine performance



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TAPPETS**



AUTOMOTIVE • AVIATION • MARINE

Johnson

PRODUCTS INC.

MUSKEGON, MICHIGAN

"Tappets Are Our Business"

49 Mercury

(Continued from page 30)

its bed. This is said to improve distribution of fuel and arrest the flow of raw gasoline to the rear cylinders, particularly during the warmup period.

Principal changes in the electrical system are relocation of the distributor and a new type automatic spark advance. The distributor now is

(Turn to page 74, please)

PRODUCTION UP 25% to 40% with ARO tools on assembly lines

Aro Impact Screw Driver Model 131 drives No. 8 screws to fasten casters to frame of food conveyor.

Fastening handles to Roasterette body with No. 8 screws driven into clip. Aro Model 22LPH.

The Swartzbaugh Manufacturing Co., Toledo, Ohio, makers of Everhot electrical products, installed Aro screw drivers, nut setters, drills and grinders on assembly lines. Production went up 25% to 40%!

This is one of many companies Aro field engineers have helped to find *faster* and *better* ways to handle tough assembly jobs. Why not let our trained engineers check your assembly problems? Just write or wire... The Aro Equipment Corp., Bryan, Ohio.

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Name

Street

City State

Fastening trim bands and reflector assembly to room heater body. Aro Model 22LPH Screw Driver.

At left, driving No. 8 screw to attach handle on griddle. Aro Model 22LPH. At right, Aro Model 3012 Nut Setter drives No. 8 nut in broiler unit.

Setting nuts at right angle in Roasterette. Aro Model 22LRJ.

Drilling holes in stainless steel panel for food conveyor body. Aro Model 7027.



How LONG -

SINCE YOU'VE
WRITTEN OFF YOUR OLD
DRILLING MACHINES?



MODEL C-20 SIBLEY 20" SWING DRILLING MACHINE

Many manufacturers are still operating old drilling machines whose costs were written off years ago. Now obsolete in speed, accuracy and operator efficiency, they are a decided handicap in paring costs to offset higher labor rates.

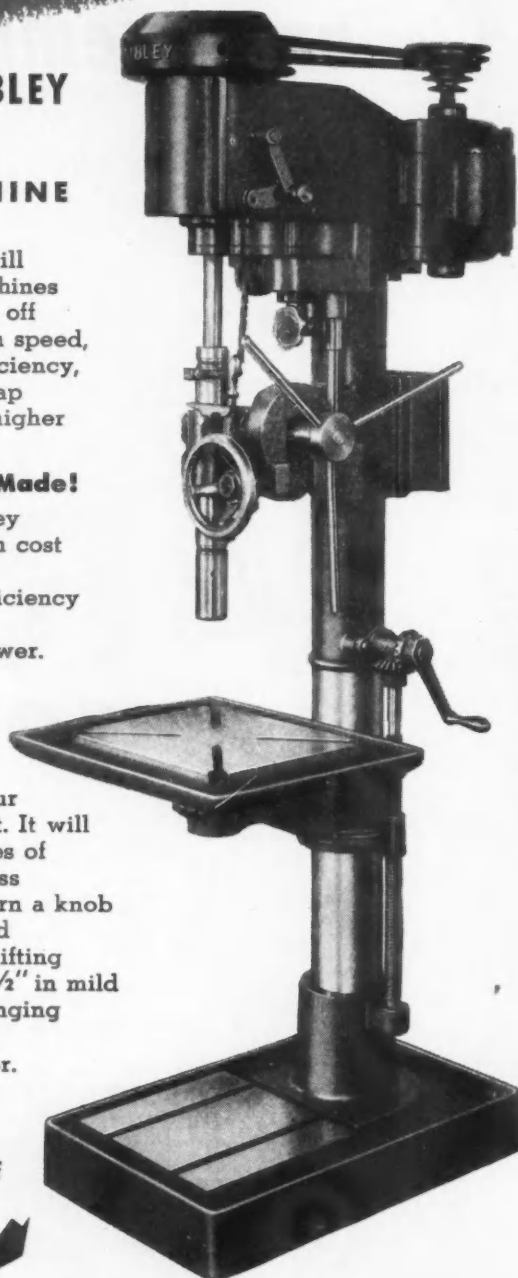
Cost Savings Can Be Made!

The new model C-20 Sibley will furnish you savings on cost per piece by—

1. Increased operator efficiency and output.
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Install a new model C-20 in your plant and make a Time and Motion Study comparison with your present drilling equipment. It will demonstrate the advantages of such features as easy access to controls—where you turn a knob to select the proper geared power feed; convenient shifting of V-belt; power to drill 1½" in mild steel; 8 spindle speeds ranging from 65 to 1360 R.P.M. powered by a 2 H.P. motor.

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Send Catalog No. 67, Free!

NAME _____
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49 Mercury

(Continued from page 72)

mounted atop the engine for more convenient servicing. It has only one breaker arm instead of the two formerly used. The new automatic spark control consists of a diaphragm connected to the air passage in the down-draft carburetor. It is simpler and more trouble-free than the complex centrifugally-operated type governor, formerly used, company engineers say. The high voltage coil also is a higher capacity unit with greater heat conductivity.

Three internal engine improvements are aimed at better oil control. One-piece valve guides are used in the new Mercury engine instead of the split type two-piece guide previously employed. They are credited not only with reducing possibility of oil and air leakage, but also are simpler and less costly. Aluminum pistons with a steel strut cast into the skirt are said to improve oil control, eliminate cold-slap, and permit hot engine clearance fitting at the factory. The third major engine improvement is adoption of locked-in connecting rod bearings, a departure from the previous floating type. They are claimed to be simpler and to give improved oil control. To reduce chances of oil leakage, additional bolts are provided at the rear bearing seal. Three new engine mounts of rubber bonded to steel are lighter and more resilient than the previous type and are designed to give improved insulation and quieter operation. They also reduce any tendency to clutch chatter.

CALENDAR

Conventions and Meetings

Amsterdam Auto Show.....	Apr. 30 to May 9	
American Foundrymen's Assoc.—Foundry Show, Philadelphia	May	3-7
British Industries Fair—Birmingham and London	May	3-14
Vienna Auto Show	May	5-17
Natl. Highway Users Conference, Second Highway Transportation Congress, Washington, D. C.	May	6-7
Illinois Inst. of Technology Symposium on Numerical Methods of Analysis in Engr., Chicago.....	May	7
Amer. Mgr. Assoc., Tool Mfg., Chicago	May	13-14
Soc. for Experimental Stress Analysis—Annual Mtg., Pittsburgh.....	May	27-29
Auto. Engine Rebuilders Assoc. Convention, Buffalo	May	27-29
32nd International 500-Mile Race, Indianapolis	May	31
Amer. Roadbuilders' Assoc. Road Show, Chicago	July	16-24
Natl. Air Races, Cleveland.....	Sept.	4-6
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia	Sept.	13-17
Turin (Italy) Auto Show.....	Sept.	15-26
Commercial Motor Transport Show, London	Oct.	1-9
Paris Auto Show	Oct.	7-12
London Auto Show.....	Oct. 27–Nov. 6	
Automotive Service Industries Show, Navy Pier, Chicago.....	Dec.	6-10
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24-27	
Society of Motor Mfrs. International Motor Exhibition, London....	Oct. 28–Nov. 6	

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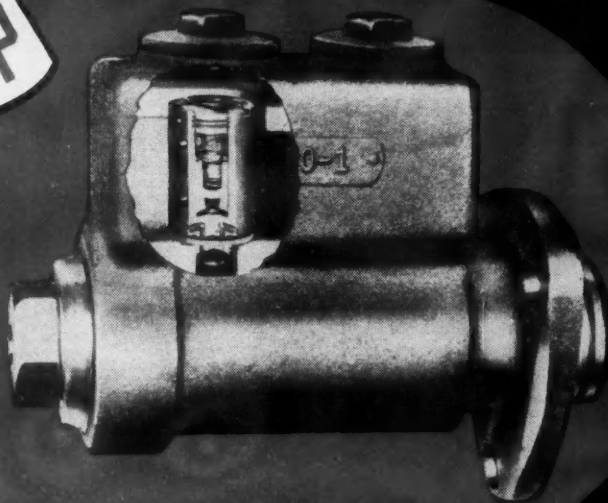


BRAKE PRODUCTS

MICO POWER BRAKE CYLINDER

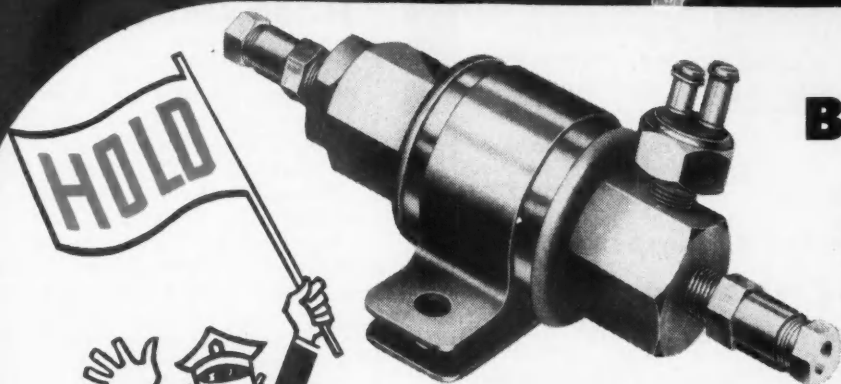
STOP SAFELY! Give your handling equipment double braking power. Install MICO Power Brake Cylinders. Piston within a piston principle plus the MICO patented relief valve increases effective brake pressure and insures quick, smooth stops.

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PUBLICATIONS AVAILABLE

(Continued from page 56)

gently approach the problem of fracture. It is a summary of reviews of the literature and direct interviews with many outstanding men in the field. It is divided into two parts. Part I includes the original survey of the literature and an analysis of the theories of fracture and applications of principles. Part II serves as a supplement in that it uses the

framework established in Part I to clarify new developments in the theories of fracture and plastic flow. Copies are \$1.00 each. Available through the Society headquarters, 33 West 39th Street, New York 18.

H-104—Face Milling Cutters

Continental Tool Works—A new booklet lists advantages of inside and outside cone face milling cutters, includes drawings showing how blades are locked in the cutters and

gives specifications for the various types.

H-105—Internal Comparators

Pratt & Whitney Div. Niles-Bement-Pond Co.—Circular No. 499 describes and illustrates Electro-limit Internal Comparators. Information is given on the design features and principle of operation, together with specifications for the various models.

H-106—Supermicrometers

Pratt & Whitney Div. Niles-Bement-Pond Co.—Circular No. 497 describes and illustrates the Supermicrometer, a precision instrument with controlled measuring pressure. A table of specifications is included.

H-107—Flexible Couplings

American Flexible Coupling Co.—Relief from Bearing Wear Grief is the title of a new 24-page color booklet describing the functions of flexible couplings. An explanation and analysis is given to the principles by which couplings operate and their importance in relationship to the equipment it connects. Practical helps to design engineers, plant engineers and maintenance men are included.

H-108—Welding Procedures

Ampco Metal, Inc.—The line of bronze welding electrodes produced by Ampco is illustrated and described in Bulletin W-17 entitled Welding with Ampco Bronze Electrodes. Considerable emphasis has been placed on welding technique and procedures. A weldability chart is included showing many diverse types of application with recommendations as to which Ampco bronze electrode to use in each case.

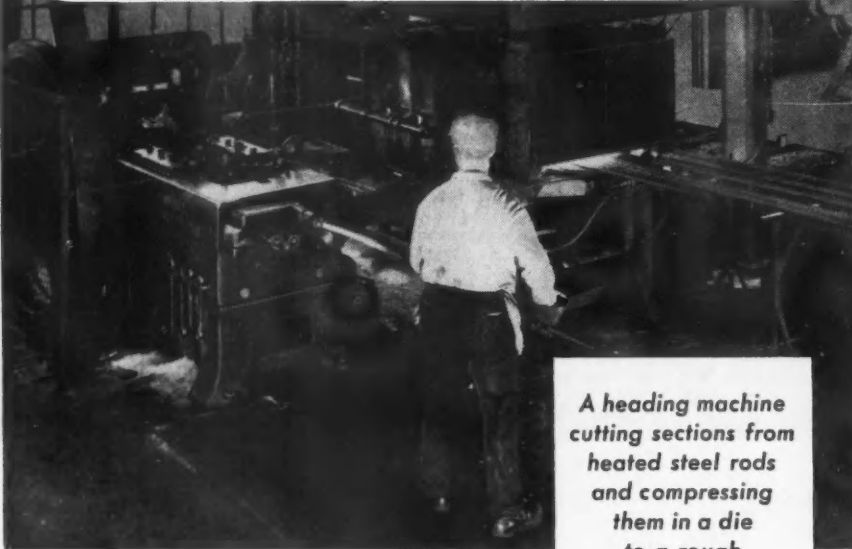
H-109—Nickel Alloy Steels

The International Nickel Company, Inc.—A newly revised booklet, The Properties of Heat Treated Wrought Nickel Alloy Steels, contains new data, largely in the form of charts, on the properties of the more commonly used engineering steels containing up to 5 per cent nickel. Detailed information on heat treatment methods, both for carburizing and

(Turn to page 78; please)

This is How

STROM BALLS are Born



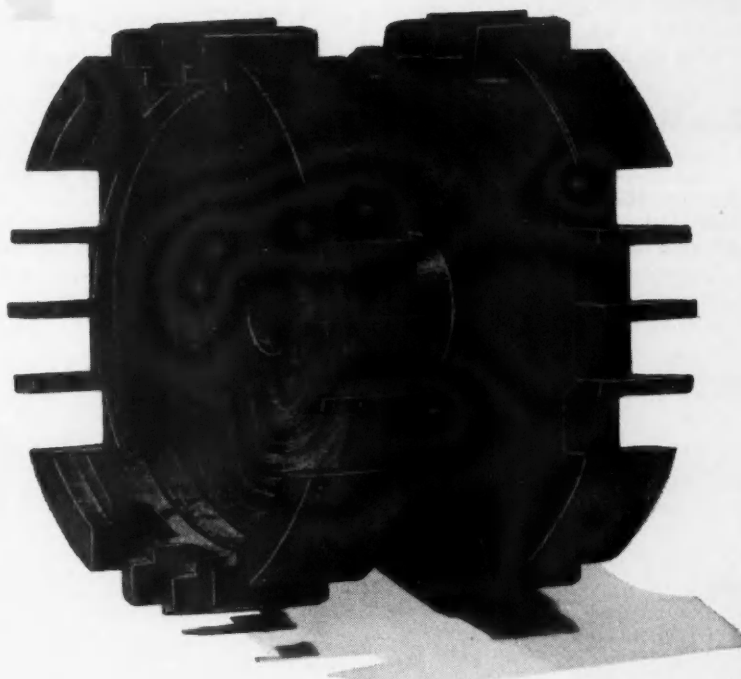
A heading machine
cutting sections from
heated steel rods
and compressing
them in a die
to a rough
spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS  **Serve Industry**
Largest Independent and Exclusive Metal Ball Manufacturer

Not much larger than your thumb, this part for a delicate remote control instrument had to hold its dimensions perfectly for dependable, accurate performance. Made of *Dilecto*, it machined as easily as wood . . . and assured dimensional stability!

TREATS DIMENSIONS WITH RESPECT...



Machines Like Wood, Yet Holds Close Tolerances!

In what other material for your industrial applications can you find *every one* of these properties . . .

- ... lighter-than-aluminum weight
- ... high dimensional stability
- ... positive moisture and heat resistance
- ... extra wear resistance
- ... corrosion resistance
- ... easy machining
- ... rubber-like resilience

Here is a laminated plastic whose unusual combination of physicals can open up whole new fields of better applications within your product. *Dilecto* combines the many advantages of a metallic material with the easy utility of a non-metallic. Like a metal it gives you high strength, wear resistance, toughness, and dimensional stability. Like wood it is easy to drill, tap, shape, mill, and thread. And like

rubber it is resilient enough to absorb shock and cushion vibration.

Think of how these properties can help you realize better product performance, higher quality, and lower costs, right now! Decide to contact your nearest C-D office and talk to a trained technician. He has additional information about *Dilecto* that will interest you. Call or write, now.

A Few of Many Possible Applications: Bearings • Gears • Sleeves
Couplings • Structural Supports, etc.

Available Standard Forms: Sheets
Rods • Tubes

DM-3-48

BRANCH OFFICES: NEW YORK 17 • CLEVELAND 14 • CHICAGO 11 • SPARTANBURG, S. C. • SALES OFFICES IN PRINCIPAL CITIES
WEST COAST REPRESENTATIVE: MARWOOD LTD., SAN FRANCISCO 3 • IN CANADA: DIAMOND STATE FIBRE CO., OF CANADA, LTD., TORONTO 8

Continental = Diamond FIBRE COMPANY

Established 1895...Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE

PUBLICATIONS AVAILABLE

(Continued from page 76)

direct-hardening compositions, is given along with suggested applications.

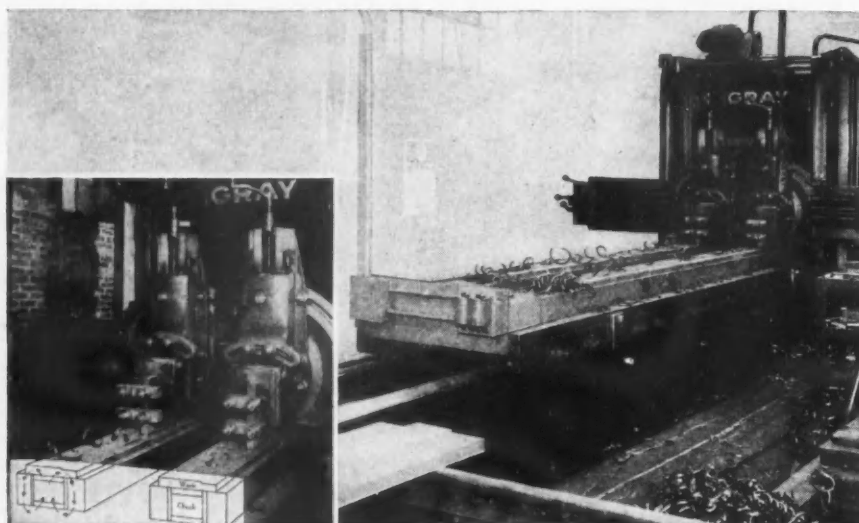
H-110—Materials Handling

The Mercury Manufacturing Co.—The second edition of Catalog No. 7-11 illustrates and describes Mercury equipment and features, including newest additions to its material

handling line. Complete specifications and applications are given on Ford trucks, lift trucks, tractors and trailers.

H-111—Flame-Otrol Combustion Safeguard

Wheelco Instruments Co.—A new 12-page bulletin has been issued containing illustrations, wiring diagrams and a complete description of Wheelco Flameotrol Combustion Safeguard Systems. Listing of instrument models with recommendations for application, sensing units for gas and oil operation, etc. are presented.



Power-Grip Holding Provides Rare Possibilities For Lowering Planing Costs

The work illustrated above is planing shear blades, 18-feet long, two at a time, held with Power-Grip Chucks. On jobs of this type, requiring two mechanical settings, changing to Power-Grip Magnetic Holding accomplishes a reduction in floor-to-floor time representing an extremely favorable cost adjustment. And added to the time-saving factor is improvement of the quality of work resulting from the uniformity with which the entire length of the material is held down.

Power-Grip Chucks represent a modern magnetic holding technique offering broad possibilities of production improvement that can be effected immediately.

You can quickly learn the possibilities for any job by sending us prints and operating data, so we can submit a complete proposal for Power-Grip Holding.

ROCKFORD MAGNETIC PRODUCTS CO., INC.

1314 18th Avenue, Rockford, Illinois



Send for
This Booklet

ROCKFORD

POWER-GRIP

CHUCKS



Body Stampings

(Continued from page 41)

the "O" or fully annealed temper must be used. The cold work resulting from the drawing operation generally hardens the material sufficiently for most purposes. Unfortunately, however, some parts receive substantial amounts of cold work over some areas but receive little or no cold work in other areas. A portion of the part will, therefore, remain quite soft.

An aluminum alloy automobile door that was formed over existing tools for steel with little or no change in the tooling is shown in Fig. 8. Fig. 9 shows an automobile rear deck liner that was drawn from aluminum using existing tools made for steel. Both parts were experimentally produced of Alcoa 61S-0 aluminum alloy and were subsequently solution heat-treated and artificially aged to 61S-T6 temper. Although it was not tried, it is felt certain that either Alcoa No. 2 or No. 3 automotive sheet would also have formed successfully.

The press equipment used to handle steel or brass stampings can also be utilized for the aluminum alloys. The selection of the type, size and capacity of the press is influenced by factors such as the shape and thickness of the blank, depth of the part, as well as the alloy and temper of the material. Many plants have a preference for a particular type of press, hence it is not surprising to find similar parts being produced over several types of equipment in different plants.

PERFORMANCE FACTOR

Many readers have requested us to clarify the meaning of the column heading "Performance Factor" which is shown on page 129 of the March 15, 1948 (Statistical Issue) of Automotive Industries.

The Performance Factor is calculated by the equation:

$$F = \frac{3825 \times D \times r}{Wd} \text{ cu in. per ton-ft}$$

under gas pressure, where D is the displacement of the engine in cu in., r, the rear-axle ratio; W, the shipping weight of the car plus 500 lb. for passengers, gasoline, oil water, etc.; and d, the effective tire diameter in inches. The constant 3825 results from the conversion from pounds to tons, and from inches to feet; it also includes the value of pi (3.1416) and takes account of the fact that only every second stroke is performed under gas pressure.

The higher Performance Factor is desired.

it's little things that count



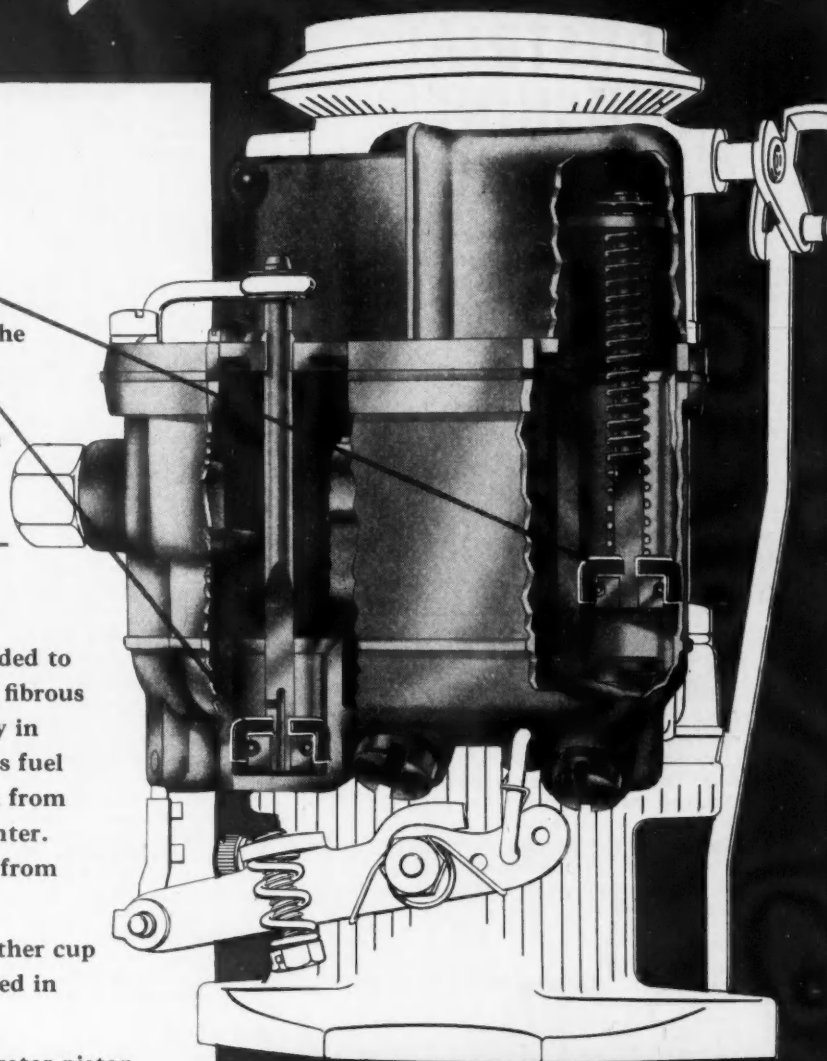
Like that little squirt of gasoline, when you want quick starting and fast pick-up. And the little piston pump packing which helps you get it. In Stromberg carburetors (made by Bendix Aviation Corp.), special care is taken to assure complete dependability of every component part. In model BXVD-3, for instance, two leather cup packings are used—one on the dash pot piston and the other on the pump piston.

These cup packings must be accurately molded to size; they must *stay* wrinkle-free; and their fibrous texture must have that tightness found only in prime calfskin. These cups must not by-pass fuel or become logged; they must neither shrink from heat nor freeze to their cylinder walls in winter. Their leather tannage must not deteriorate from contact with oils or gasoline.

Non-deteriorating *chrome* tanned Sirvis leather cup packings, made by Chicago Rawhide, are used in thousands of Stromberg carburetors.

Chicago Rawhide engineered the first carburetor piston pump packing to deliver satisfactory performance. Today, they are used in many leading makes. Because of constant research and product development, precise laboratory control, highest standards of leather quality, and exceptional care in every phase of production, Chicago Rawhide's Sirvis leather piston pump packings continue to be the most dependable.

CHICAGO RAWHIDE MANUFACTURING CO.
1310 Elston Avenue Chicago 22, Illinois



for assured performance

in your leather applications—whether in connection with oils, grease, water, or air, under high, low or static pressures—specify SIRVIS.

Your inquiries will be promptly answered.

SIRVIS
MECHANICAL LEATHERS



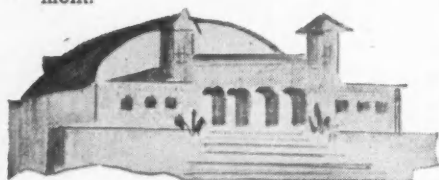
OUR 70th YEAR OF INDUSTRIAL SERVICE

ATLANTIC CITY by-the-sea

June 28 to July 1

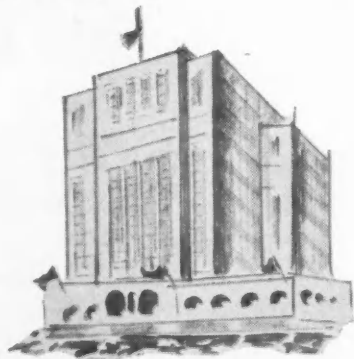
INDUSTRIAL FINISHING EXPOSITION

A comprehensive exhibit of equipment and supplies for manual and automatic electroplating, polishing and buffing, cleaning and degreasing, tumbling and burnishing, enameling and lacquering, and allied processes. Of interest and value to all manufacturers concerned with metal surface treatment.



A. E. S. CONVENTION

35th Annual Convention of the American Electroplaters' Society combines profitable learning and observation with pleasant relaxation. Technical Sessions bring outstanding technicians and production men to tell how to do better plating and finishing. Complete program of entertainment provided by the Convention and the famous seashore resort.



Make plans now to attend this Exposition and Convention. Exposition and Technical Session in Atlantic City's Convention Hall; Convention Headquarters in Ambassador Hotel. Sponsored by the A.E.S. Newark Branch.

For further information, write

**AMERICAN ELECTROPLATERS'
SOCIETY**

National Office, P. O. Box 168
Jenkintown, Pa.

Business in Brief

Written by the Guarantee Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

Continuation of the downward trend in general business activity is indicated. The *New York Times* index for the week ended April 3 stands at 143.6, as against 146.3 for the preceding week and 142.2 a year ago.

Sales of department stores during the week ended April 3, as reported by the Federal Reserve Board, equaled 282 per cent of the 1935-39 average, as compared with 331 in the week before. Sales were 12 per cent below the corresponding distribution a year earlier, as against a preceding similar excess of 17 per cent. The total in 1948 so far reported is five per cent greater than the comparable sum in 1947.

Electric power production declined slightly in the week ended April 3. The output was 7.3 per cent above the corresponding amount in 1947, as compared with a similar advance of 7.1 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 661,807 cars, 0.4 per cent less than the figure for the week before and 7.5 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended April 3 averaged 5,388,700 barrels daily, or 11,450 barrels more than the preceding average and 497,100 barrels above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended April 3 is estimated at 2,135,000 net tons, 15,000 more than the output in the week before. The total production in 1948 so far reported is 17 per cent below the corresponding quantity in 1947.

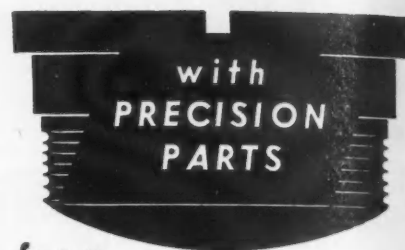
Civil engineering construction volume reported for the week ended April 8, according to *Engineering News-Record*, is \$93.8 million or 57 per cent less than the preceding weekly figure and 25 per cent below the comparable sum in 1947. The total recorded for 15 weeks of this year is 20 per cent more than the corresponding amount in 1947. Private construction is nine per cent below that a year ago, but public construction has increased by 68 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended April 3 is 160.1 per cent of the 1926 average, as compared with 161.1 for the preceding week and 148.8 a year ago.

Member bank reserve balances increased \$266 million during the week ended April 7. Underlying changes thus reflected include a decline of \$522 million in Reserve bank credit and a decrease of \$832 million in Treasury deposits with Federal Reserve banks, accompanied by an advance of \$4 million in money in circulation.

Total loans and investments of reporting member banks declined \$1011 million during the week ended Mar. 31. A reduction of \$67 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$14,417 million shows a net increase of \$2146 million in 12 months.

SAVE PRODUCTION TIME



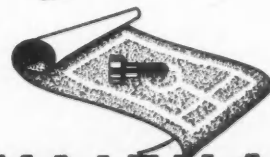
from
**WALTHAM SCREW
Company**

Your production will
go up when rejects go
down. Yes, Waltham
Screw Company special-
izes in quality and uni-
formity in precision
parts for automotive
production lines.

Waltham Screw can
supply you with special
fittings, screws and ac-
cessories at low prices.

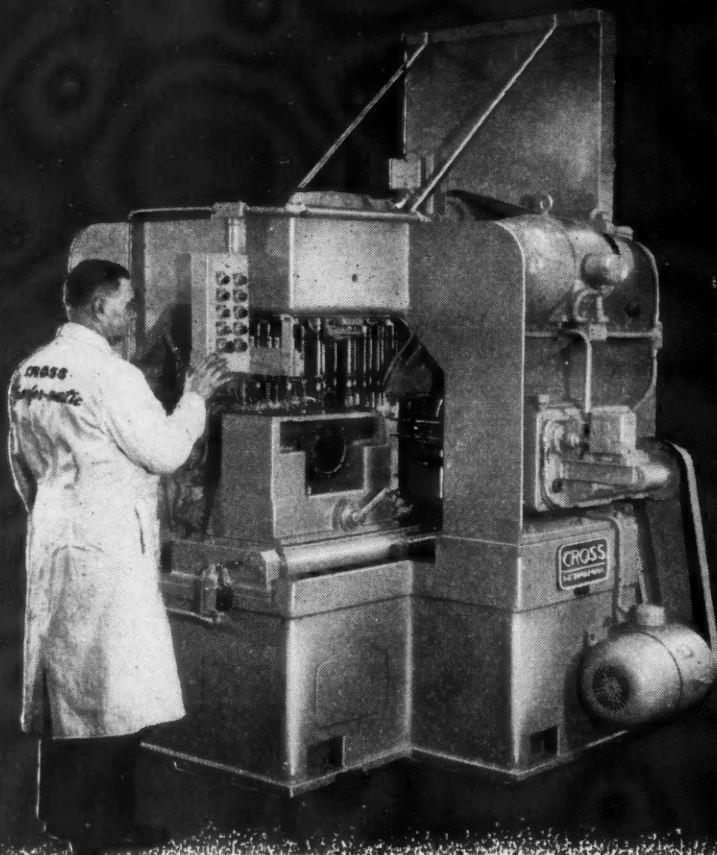
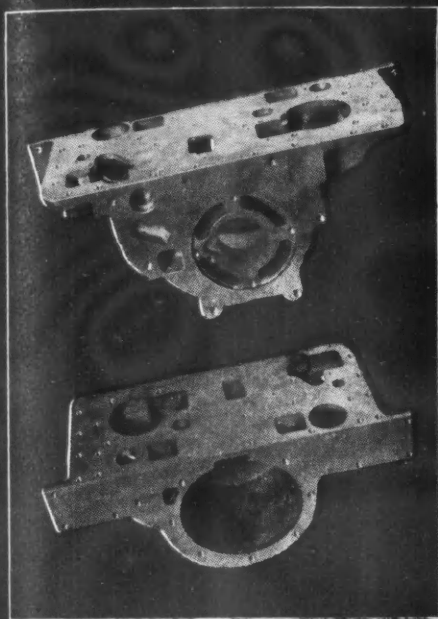
Send your blue prints
today . . . we will send
quotations that will
please your efficiency
expert.

UNIFORMITY . . .
QUALITY . . .
ECONOMY . . .



**WALTHAM
SCREW COMPANY**
73 Rumford Avenue, Dept. A
WALTHAM, MASS.

Another Special Machine by Cross



New Machine

Taps 60 Holes in Automatic Transmission Case

The special Cross tapping machine illustrated above is a typical example of how custom-tailored machines can balance investment and labor costs to meet specific production requirements.

In this instance, only *moderate* production was desired. So, progressive cutting was not required and manual loading and clamping replaced power operated mechanisms customarily used in high production machines. When the cycle button is pressed, 25 holes are tapped at Station One. The part is next shuttled to Station Two where 35 more holes are tapped. Then it is returned to Station One and unloaded manually.

The savings derived by eliminating unnecessary features result in a low original investment for a special machine which provides a balanced work load for the operator while producing the necessary number of pieces per hour.

PART: Automatic Automotive Transmission Case.

OPERATION: Tap all holes.

PRODUCTION: 53 pieces per hour at 80% efficiency.

EQUIPMENT: Cross Special Two-Station, Shuttle-type Tapping Machine.

FEATURES: ☆ Automatic shuttle for carrying the part from Station One to Station Two and return ☆ Individual lead screw feed for each tapping spindle ☆ Safety device for each spindle to eliminate breakage of taps if holes have not been drilled in previous operation ☆ Lubricating system which provides a measured amount of oil for each tap with every cycle ☆ Floating tap holders ☆ Push button controlled automatic work cycle.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE **CROSS** COMPANY

Established 1898

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

Personals

Willys-Overland Motors — **Robert E. Busey**, now acting Chief Engineer, has been made Chief Engineer.

Packard Motor Car Co. of Canada, Ltd. — **Fred C. Williams** has been named a Director of the Company, succeeding the late **Colonel E. S. Wigle**.

The White Motor Co.—**Bernard A. Gunn** has been named Secretary of the White Motor Co. of Canada, Ltd.

The White Motor Co.—**Charles H.**

Miller, Manager of Export Coach Sales.

Kaiser-Frazer Corp. — **Henry M. Swartwood** appointed Director of Advertising.

Nash Motors Div., Nash-Kelvinator Corp. — **E. W. Bernitt** appointed Works Manager of Kenosha plant.

Chevrolet Motor Div., General Motors Corp.—**Dale E. Douglass**, Manager of Oakland, California plant, **M. W. Howe**, head of Tarrytown plant.

Consolidated Vultee Aircraft Corp.—**Georges de Sonchen** has been ap-

pointed Director of European Sales.

Nash-Kelvinator Corp.—**R. H. Good** appointed Supt. of Planning at the El Segundo, California plant.

Chance Vought Aircraft Div., United Aircraft Corp.—**J. R. Clark**, appointed Chief of Experimental Section of Manufacturing Dept. **R. M. Carlson**, Senior Project Engineer, succeeding Mr. Clark. **J. B. Schlie-mann**, Acting Chief of Design Operations.

Bell Aircraft Corp. — **Dr. L. I. Shaw**, Rocket Research Engineer.

Bell Aircraft Corp. — **Edmund E. Wegrzyn** has been appointed Traffic Manager, succeeding **Elmer Dunn**, resigned.

Seiberling Rubber Co.—**Warren H. Snow**, elected a Director of the Company.

Carpenter Steel Co.—**O. V. Greene**, made Manager of Product Development. **H. Sturgis Potter**, Manager of Tool Steel Sales, has been appointed Sales Manager in charge of all Reading products.

Sheffield Corp.—**Oscar A. Ahlers** was elected a Vice-President.

The Carpenter Steel Co.—**Frank R. Palmer** was elected President, succeeding **J. Heber Parker**, who becomes Chairman of the Board. **R. V. Mann** was elected Vice President in Charge of Sales.

Lear, Incorporated — **Frederick D. Gearhart, Jr.** and **L. R. Raemer** were elected Directors of the company. **Joseph A. Golde**, Counsel for Lear, was elected Secretary.

Elastic Stop Nut Corp.—**E. F. Na-son**, General Sales Manager.

Pyrene Mfg. Co.—**George H. Boucher**, Vice-President in Charge of Sales, elected to the Board of Directors. **Charles G. Durfee** has been made a Vice-President.

Bendix Aviation Corp.—New directors are **Clarence W. Avery** and **John M. Floyd**.

Eaton Mfg. Co.—**F. A. Buchda** has resigned as Vice-President. **Herbert S. Ide, Jr.**, formerly Asst. Secretary and Asst. Treas., is now Treasurer and Asst. Secretary.

General Motors Corp., Detroit Diesel Engine Div.—**Laurence F. Ducey**, Asst. to the General Sales Manager.

The General Tire & Rubber Co.—**John O'Neil**, Treasurer, succeeding **Winfred E. Fouse**, who remains as a member of the board.

Borg - Warner Corp., Rockford Clutch Div.—**E. C. Lanno**, Development Engineer.

Morse Chain Co., Morse-Rockford Sales Div.—**D. C. McNeely**, Manager.



RIBBED AND PLAIN...

LARGE AND SMALL...

GUNITE PROCESSED IRON has proved to be an ideal material from which to cast Brake Drums for a wide variety of services. It is a fine-grain, high-strength iron, with uniformly distributed graphite particles, easily machinable, and uniformly controlled as to grade. The picture above shows four notable application examples — a large ribbed drum for heavy-duty highway truck service, a larger and narrower plain drum used on big logging trucks, and, in contrast, the drum for a popular make of motorcycle, and the drum (with integral hub) used on a familiar small-size high-performance passenger automobile. This picture shows the rough castings after cleaning, ready for machining either by us or in the

customer's plant. GUNITE BRAKE DRUMS have shown their superiority by a hundred million miles of silent proof in tough over-the-road service. Buy GUNITES — for better braking!



GUNITE CAST WHEEL ASSEMBLIES FOR TRAILERS AND TRUCKS INCLUDE FAMOUS GUNITE BRAKE DRUMS

a LORD VIBRATION CONTROL SYSTEM

Promotes Passenger Comfort
Protects Engine and Bus
in the
FLXIBLE CLIPPER
29 BI

The same Lord Vibration Control System that gives the passengers greater comfort and pleasure also protects the power plant against road shocks, isolates engine vibration from frame and body, reduces repairs and prolongs bus life, builds goodwill for the bus company and the bus manufacturer.

Flxible accomplishes all this by the use of six Lord Vertical Snubbing Tube Form Mountings; two dual units at the transmission and clutch end, and two single units at the fan end of the engine.

This is another illustration of the extreme importance of vibration control, and of the low first cost and long-time economy of a Lord Engineered Vibration Control System. Whether your product is as large as a bus or as small as a dial gauge, its life can be lengthened and the quality of its service improved by a Lord Vibration Control System.

Various Bulletins available on Vibration Control Mountings, Flexible Couplings and Bonded Rubber Products. For applications providing vibration isolation regardless of direction of disturbing forces, Bulletin No. 106; for applications isolating vibration but not subject to intense shock, Bulletin No. 104; for applications involving transient shock loads in addition to vibration, Bulletin No. 103; Flexible Couplings, Bulletin No. 200-C.

ANOTHER EXAMPLE OF
PRODUCT IMPROVEMENT

by **LORD**
VIBRATION
CONTROL SYSTEMS

The above illustrations show the installation of the Lord Vibration Control System.

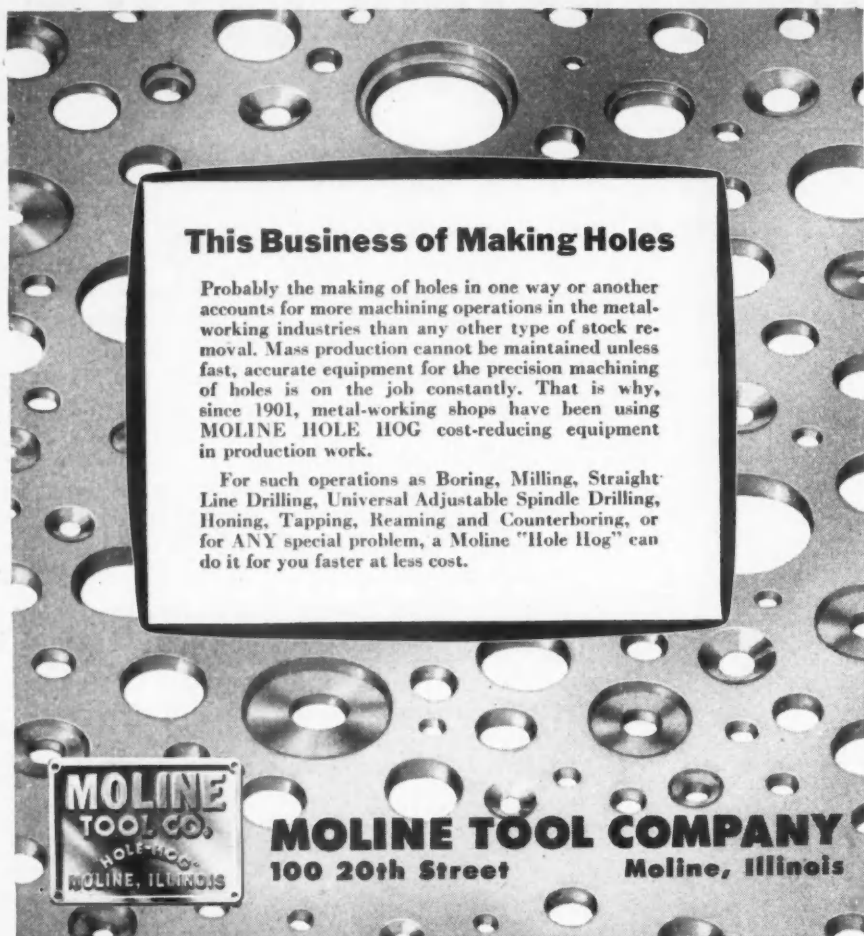
LORD

MAKE GOOD PRODUCTS BETTER

with *Vibration Control*

LORD MANUFACTURING CO. • ERIE, PA.

Field Offices: Detroit • Chicago • New York • Washington, D.C. • Providence, R.I.
Burbank, Cal. • Philadelphia, Pa. Canadian Representative: Railway & Power Engineering Corp., Ltd.



This Business of Making Holes

Probably the making of holes in one way or another accounts for more machining operations in the metal-working industries than any other type of stock removal. Mass production cannot be maintained unless fast, accurate equipment for the precision machining of holes is on the job constantly. That is why, since 1901, metal-working shops have been using MOLINE HOLE HOG cost-reducing equipment in production work.

For such operations as Boring, Milling, Straight-Line Drilling, Universal Adjustable Spindle Drilling, Honing, Tapping, Reaming and Counterboring, or for ANY special problem, a Moline "Hole Hog" can do it for you faster at less cost.

MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

"The Outstanding Basic Improvement in FLEXIBLE SHAFT Machinery in 25 Years"

The NEW Strand Rotoflex 4-speed gear drive Flexible Shaft Machine (shown upper right) is another step forward in Strand quality precision tools for faster, easier, more economical production work. The Rotoflex 4-speed gear drive employs a patented, new type of quick change gear drive utilizing 4 positive speeds by a unique and easy method of instantly changing from one speed to another. Rotoflex machines are powered with totally enclosed ball-bearing motors having speeds from 850 to 9000 R.P.M., depending on motor.

Standard type Strand machines, (lower right) give portable rotary power at constant speeds with dependable results in all grinding, buffing, drilling, wire brushing and rotary filing operations. Hundreds of types and models from 1/8 to 3 H.P. available with suitable attachments for your specific requirements.

*Distributors in all principal cities
Ask for Bulletin No. 43 and Catalog No. 30*



N. A. STRAND & CO.
5002 NO. WOLCOTT AVE.
CHICAGO 40, ILL.

General News

(Continued from page 23)

Ford Reports Reduction In Unfilled Orders

In the face of reports by other companies that unfilled automobile orders are increasing faster than retail deliveries, Ford Motor Co., revealed recently that its backlog has dropped from 1,700,000 to 1,575,000 since Jan. 1. However, this total includes trucks and the high priced Lincoln line and probably does not reflect a decline in the popular priced Ford and Mercury models. The tabulation was made after a vigorous "wringing out" of orders on dealer's books. Ford has also been out of production for some time and advance orders may have been delayed in anticipation of the completely restyled new models which the public has known are coming. It is generally believed that the company's backlog of unfilled orders will climb sharply following introduction of the new models to the public. Lincoln and Mercury were announced in late April and the Ford is expected to appear in June.

Road Builders Show in Chicago, July 16-24

About 300 exhibitors will participate in the American Road Builders Association show, to be held in Chicago from July 16 to July 24, at which the latest in road and airport building equipment will be shown.

Annual Scrappage Averages 2 Million Cars & Trucks

Figures compiled by R. L. Polk & Co. indicate that the annual replacement market requirements of motor vehicles over the past 23 years average nearly two million units a year. The survey shows that for the 23-year period, 1925 through 1947, 43,647,088 vehicles were scrapped, consisting of 37,972,954 passenger cars and 5,674,134 trucks. During the

(Turn to page 86, please)

1947 BRITISH TRUCK PRODUCTION BY MONTHS

1947	Total	Production For		
		Serv-ices	Home Market	Export
January ..	13,159	56	9,035	4,068
February ..	5,792	59	4,223	1,510
March	11,339	59	7,854	3,426
April	12,320	45	8,556	3,719
May	14,301	52	9,874	4,375
June	14,826	66	10,203	4,557
July	11,975	31	8,309	3,635
August	10,733	16	7,363	3,354
September ..	16,650	1	10,980	5,689
October	14,082	1	9,070	5,021
November ..	13,734	..	8,632	5,102
December ..	15,749	..	9,803	5,946
Total ..	154,670	386	103,882	50,402

Source—The Motor Trader.

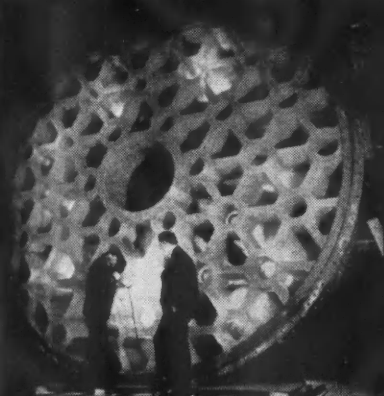
WORLD'S MOST Precious CARGOES

hauled by
Spicer Equipment!

Spicer equipped war vehicles have carried our fighting men to victory on every front. Spicer equipped automotive vehicles transport millions of people daily all over the world. • Spicer



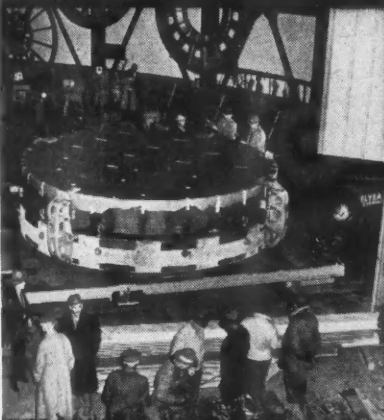
equipped trucks recently hauled the world's most precious piece of glass, a 200" diameter mirror, 15 tons heavy, from Pasadena to the top of Palomar Mountain.



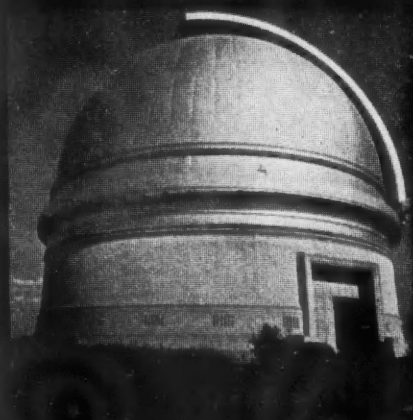
This giant mirror will enable man to extend his vision into the heavens to a range of one billion light years; a distance so great that the human mind cannot comprehend or understand it.



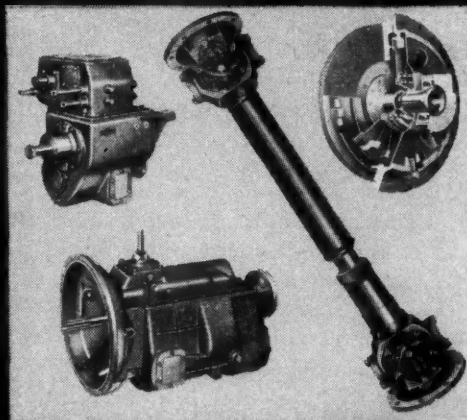
The Belyea Truck Co. used Sterling Trucks with 150 hp. Cummins Diesel engines, Spicer Brown-Lipe Transmissions, Spicer Auxiliary Transmissions, Spicer Propeller Shafts and Universal Joints, and Spicer Clutches to haul the 15-ton mirror to the top of Palomar Mountain. The 130-mile trip from Pasadena was made without mishap, four hours ahead of schedule—another precious cargo safely delivered by Spicer power transmission equipment!



The giant mirror safely delivered to the observatory after the long 130-mile haul, and being carefully unpacked.



The beautiful Dome Building which houses the precious 200" diameter mirror at the Palomar Mountain observatory in San Diego County.



Spicer Brown-Lipe Transmission, Auxiliary Transmission, Propeller Shaft, Universal Joints, and Clutch used to haul world's most precious mirror.


Spicer engineers have the know-how . . . the Spicer plant has the equipment . . . to meet your individual requirements in automotive power transmission equipment.

SPICER MANUFACTURING • Division of Dana Corporation
TOLEDO 1, OHIO



TRANSMISSIONS • TORQUE CONVERTERS • PASSENGER CAR AXLES • CLUTCHES
STAMPINGS • UNIVERSAL JOINTS • SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY

PARISH FRAMES
GENERATOR DRIVES



**DOES CUT
DE-BURRING TIME**

**DIE CASTING COMPANY
REPORTS . . . (NAME ON FILE)**

**"ONE MAN CAN DE-BURR
AN AVERAGE OF 12,000
PIECES IN FIVE HOURS."**



Unretouched illustration shows die cast plumbing fixture at left before Roto-Finish de-burring and finishing; at right after Roto-Finishing.

Roto-Finish eliminates the great bottleneck in modern production. Hand finishing is slow, inaccurate, and requires a large labor force. Roto-Finish processes quickly, uniformly, and without loss of tolerance, enormous quantities of intricate castings and precision parts of steel, brass, aluminum, magnesium, stainless and nickel steels. Send samples for processing. (Include finished part for guide.) No obligation.

THE STURGIS PRODUCTS CO.
867 JACOB ST., STURGIS, MICHIGAN

ROTO-FINISH

THE ENGINEERED
MECHANICAL FINISHING PROCESS

General News

(Continued from page 84)

same period new vehicle registrations amounted to 51,776,624 cars and 9,926,351 trucks for a combined total of 61,702,975 units. The survey also shows that vehicles in operation increased 18,055,887 units. Of this total, passenger cars accounted for 13,803,670 and trucks for 4,252,217.

GM Plans to Dispose of Greyhound Stock

GM is expected in the near future to dispose of its holdings in Greyhound Corp. common stock amounting to an estimated 344,000 shares. GM acquired the stock among the assets of Yellow Truck & Coach Mfg. Corp. The corporation already this year has disposed of almost 400,000 shares of common stock of Bendix Aviation Corp., and is also reported to be considering disposal of approximately one million shares of North American Aviation Inc. stock.

Ford Paper Mill Addition Doubles Output

Capacity of the Ford paper mill at the Rouge plant has been increased to 80 tons daily with completion of a one story addition. Output is now doubled the previous capacity. Ford is the only company to make its own panel board used as a foundation for body trim, upholstery backing, truck and door liners, and glove compartments. More than 40 lb of paneling board manufactured from waste paper collected throughout the Rouge plant will be used in each 1949 car.

Willys Promotes Busey to Chief Engineer

Willys-Overland Motors has announced the promotion of Robert E. Busey to chief engineer. He had formerly been acting chief engineer for the company. He succeeds Walter Appel who has been appointed director

54% OF BRITISH PASSENGER CARS BUILT FOR EXPORT IN 1947

1947	Total	Production For		
		Serv-ices	Home Market	Ex-port
January ..	25,005	10	13,520	11,475
February ..	9,921	4	5,317	4,600
March	22,074	8	12,067	9,999
April	24,230	8	12,858	11,364
May	27,496	8	14,325	13,163
June	29,268	10	15,508	13,750
July	24,903	5	12,341	12,557
August ...	20,854	1	9,360	11,493
September .	28,444	3	10,065	18,376
October ...	26,236	9	8,663	17,564
November ..	23,576	..	8,117	15,399
December ..	24,993	20	9,747	15,226
Total ...	287,000	86	131,948	154,966

Source—The Motor Trader.

of procurement. In his new post, Mr. Busey will be responsible for body and chassis engineering, the engine division and research and development.

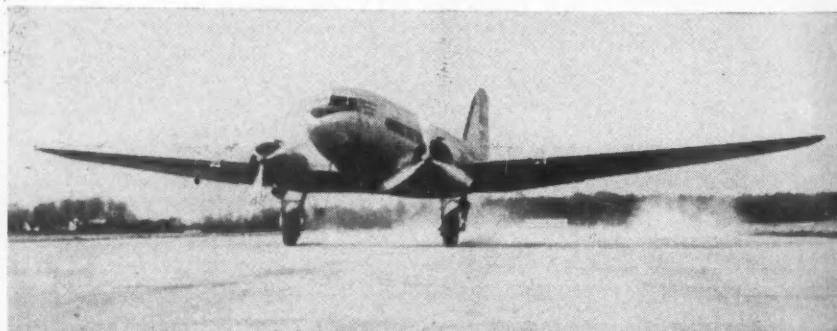
Ford Appoints McCloud to Succeed McCarroll

Ford Motor Co. has announced the appointment of J. L. McCloud as director of chemical engineering and chemical and metallurgical research, succeeding the late R. H. McCarroll. Mr. McCloud has been assistant to Mr. McCarroll since 1946. He joined Ford in 1915 and in 1920 moved to the Dearborn Engineering Laboratories. In 1936 he joined the chemical engineering department at the Rouge plant.

Obituary

Thomas Hoyt Jones

Thomas Hoyt Jones, 61, secretary and director, Glenn L. Martin Co., Baltimore; managing partner of the law firm of Jones, Day, Cockley & Reavis, Cleveland; and a director in many important corporations, died on April 14.



The new Goodyear cross-wind landing wheels were recently demonstrated on a DC-3 type transport plane. Essentially the same device as that now being installed as optional equipment on the Cessna and Stinson light planes, the DC-3 casting mechanism is placed within the hub of a 17.00-16 wheel instead of a 6.00-6 wheel.

Classified Advertisement

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